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JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS

EDITED

BY THOMAS P. JONES, M. D.

MEMBER OF THE AMERICAN PHILOSOPHICAL SOCIETY, OF THE ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, THE AMERICAN ACADEMY OF ARTS AND SCIENCES, MASSACHUSETTS, AND CORRESPONDING MEMBER OF THE POLYTECHNIC SOCIETY OF PARIS.

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JULY, 1835.

Engraving on Wood.

(SEE VIGNETTE.)

We present the readers of the Journal with a wood-cut, engraved by our fellow member, Mr. Reuben S. Gilbert, of this city, representing a scene taken from Burns' celebrated poem of "Tam O'Shanter," and copied from an engraving of Thomas Landseer's.

In a former number, (vol. x., p. 145,) we presented to our subscribers a beautiful specimen of medal ruling, which has excited much admiration, both at home and abroad; and we hope hereafter to offer further illustrations of the condition of the arts in our country.

Few persons, except artists, can *fully* appreciate the merits of this engraving as a specimen of the art, but it will, we apprehend, be generally conceded, that the entire performance will bear a strict comparison with the best European efforts in the same style.

The story which this cut is intended to illustrate, is too well known to our readers to need a description of the action of the piece, with the merit of the composition of which we have, besides, at present, no concern. Our object is to call attention to the engraving as a specimen of the art, and to the full enjoyment of it, in this point of view, the subject matter is unessential. Com. Pub.

On the comparative Corrosion of Iron, Copper, Zinc, &c., by a saturated solution of common salt. By A. D. BACHE, Prof. of Nat. Philos. and Chem., Univ. Penn.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—An inquiry was addressed to me some months since, by Mr. Joseph S. Walter, Jr., in relation to the material which would be most proper to be used for pipes to convey a strong solution of common salt to a pump intended to raise it, and for the material of the pump itself. From this solution it was intended to recrystallize the salt. The circumstances being of a somewhat complex character, I determined not to be satisfied with the indications of general theory, but to try the experiment, under the circumstances of the case, as nearly as might be possible. The materials in relation to which inquiry was particularly directed, were iron, copper, brass, lead, and zinc. Of these, the rapid oxidation of iron, when exposed to a solution of common salt, is well known; the corrosion of copper by sea-water is also well known; the influence of the earthy muriates contained in the ocean prevents this case, otherwise very closely resembling that in question, from corresponding precisely to it, the common salt referred to containing these muriates only as impurities. Zinc does not decompose water readily, and oxidates very slowly, even when exposed to the combined action of air and moisture; it also ranks below sodium in the list of electro-positive metals; its chloride, however, is soluble. Lead is readily acted upon by the combined agencies of air and water, first oxidating, and then passing to the state of a carbonate; its place in the list of positive electrics is below zinc, and, of course, below sodium, which latter we should expect, therefore, to have the greater affinity for chlorine; the protoxide of lead, however, and several of its salts, interchange elements with chloride of sodium. The chloride of lead is insoluble, and hence the presence of soluble muriates acts as a protection against the corrosion of lead by water.

As the experimental results directly obtained may possibly prove of value to others than the estimable individual for whom they were to be applied, I have thought it right to put them on record.

The materials used were iron, copper, brass, lead, and zinc, the metals being as presented in commerce, and, therefore, probably not quite pure. They were prepared in rectangular plates, about two and a half inches in length, and three-fourths of an inch in width, and varied in thickness from .03 to .07 of an inch. These were placed in glasses containing saturated solutions of common salt, rather less than one-fourth of an inch in depth from the top of each plate being left exposed to the air. The vessels were left uncovered, and the evaporation of the water of the solutions was supplied from time to time during the exposure. The temperature in the room in which the vessels were placed, was not very different from 50° Fahr. during any part of the time.

After an exposure of about three weeks, the plates were removed from the solutions, and carefully washed and dried. Having been weighed before placing them in the solutions, they were now again weighed, and the loss of weight ascertained.

The iron plate was found covered with oxide of iron, strongly ad-


R S GILBERT Sc. PHILA

hering to it in part, and in part deposited at the bottom of the glass containing the solution. There was upon the upper plate, and in the glass, a deposit of proto-chloride (white) of copper, coloured by carbonate of copper, and a similar deposit upon the brass plate. The lead and zinc had been, to all appearance, very slightly acted upon; there was upon the latter a white deposit, probably of oxide of zinc.

The following table shows the amount of surface actually exposed to the solutions, the weight of the entire plates, and the loss of weight by the exposure. I have not reduced the weights used to grains, because the object is merely to obtain comparative results.

Material exposed.	Surface exposed.	Weight of plate.	Loss of weight.
Name.	Sq. inch.	Grammes	Grammes
Iron,	4.656	6.320	.312
Copper,	3.936	10.720	.058
Brass,	4.138	5.150	.029
Zinc,	4.572	6.115	.003
Lead,	4 762	20.080	.013

From the foregoing data I have calculated, below, the loss of weight, in grains, which a surface of forty square inches, or a plate of twenty inches on each surface, and very thin, of the materials would have suffered, and the relative loss by each material, referring to that which lost least, namely, the zinc, as the standard of comparison.

Material.	Loss of weight by 40 sq. inches of surface.	Compara. loss by exposure of same surface.
Name.	Grains.	Ratio.
Zinc,	0.40	1.00
Lead,	1.68	4.20
Brass,	4.31	10.78
Copper,	9.07	22.68
Iron,	41.27	103.18

The corrosion of the iron, with the same extent of surface as zinc, and exposed to a solution of common salt for the same length of time, is thus shown to be upwards of one hundred times that of the zinc. The zinc appears to protect the copper in the brass, probably by rendering it electro-negative, and thus diminishing the affinity of the chlorine, which would otherwise destroy the copper.

Since the experiments indicate zinc and lead as the materials to be selected from those named, on account of the slight corrosion which they suffer, lead would obviously have been the material selected for the pipes to conduct the solution of salt to the pump, and zinc for the material of the pump, the selection depending upon well known properties of these metals.

The coatings formed upon both the lead and zinc, would protect the underlaying surface from action, unless removed by mechanical force.

First Report of the Joint Committee of the American Philosophical Society, and Franklin Institute, on Meteorology.

The Joint Committee of the American Philosophical Society, and the Franklin Institute of the State of Pennsylvania, return thanks for valuable meteorological journals, received from the following gentlemen.

Mr. R. H. Gardiner, Gardiner. Maine.
Mr. Jacob Mull, U. S. Navy, Portsmouth, New Hampshire.
Mr. James Porter Hart, Farmington, Mass.
Professor Caswell, Providence, R. I.
Mr. A. W. Smith, Middletown, Conn.
Mr. Edward Gibbons, Lockport, N. Y.
Mr. C. Gill, Flushing, Long Island.
Dr. R. H. Rose, Silver Lake, Pa.
Dr. Henry Gibbons, Wilmington, Del.
Dr. G. S. Sproston, U. S. Navy, Baltimore, Md.
Dr. J. M. Foltz, U. S. Navy, Washington city, D. C.
Prof. James Hamilton, Nashville, Tenn.
Dr. John Locke, Cincinnati, Ohio.
Mr. J. Panglos, Urbana, Ohio.

Only four months have elapsed since the reception of the earliest of these journals, and already some valuable facts have been deduced from a comparison of the simultaneous observations which they contain.

A detailed report of all general conclusions, with the data on which they are founded, will be given hereafter; but as this will require a considerable length of time, and a much more extensive collation of journals than the committee have yet in their possession, they will mention, with a view to increase the zeal of their correspondents, one or two facts, which, from further observations, will probably lead to important general laws.

In all the great fluctuations of the barometer which occurred in January and February, at Nashville, Tenn. they were one day sooner than at Philadelphia; and on the 22d of March, the barometer was lowest at Philadelphia at 3 o'clock, P. M.; whereas, at Providence, R. I., it continued to fall till 9 o'clock, P. M., as very particularly noted by Professor Caswell. The exact moment of greatest depression at Portsmouth is not given by Mr. Mull, but it was lower there at 7 o'clock, P. M. on the 23d, than on the 22d at sunset; at which time it had already risen more than half an inch at Philadelphia.

Do these barometric fluctuations of great magnitude travel north-eastwardly?

Again, on the 22d of March, at the moment when the barometer was lowest at Philadelphia, the wind at York, Pa., at Flushing, N. Y., at Middletown, Conn., at Providence, R. I., and at Portsmouth, N. H., was blowing towards Philadelphia violently, especially at York and Portsmouth, while at Philadelphia it was a perfect calm. There was also, on that day, a very violent rain at York, and in

Berks county, Pa., and at Baltimore, and also a considerable rain at Flushing, Middletown, and Providence, at the same time, when there was a calm in Philadelphia, and no rain; and as this state of things continued for many hours, it seems probable that the air, which moved with great rapidity towards Philadelphia, in opposite directions, must have ascended over Philadelphia, and passed off above even with greater rapidity than it approached below, or otherwise the barometer must have risen, in a very short time, to a great height, by the conflicting impulse of these two opposite currents; but the barometer stood all this time more than three-quarters of an inch lower than usual.

The committee desire these remarks to be viewed as they are intended, to be confirmed or rejected as future observations, and a more extensive induction, shall warrant. They merely propose the queries:

Are rains caused by an upward motion of air, commencing where the dew-point is highest, or where the barometer is lowest?

Do storms in the temperate zones generally travel from some westerly point? And are those storms which so travel preceded by an easterly wind, and also followed by a westerly, unless another storm is soon to come on in the same direction? In the torrid zone, do the storms on the north side of the line travel towards the north-west, and on the south side of the line towards the south-west?

On the 29th of January, from 8 o'clock, A. M. till 4 o'clock, P. M. there fell at Nashville, Tenn., 1.47 inches of rain. This storm travelled east, and it began to rain at Cincinnati at half-past 12 o'clock, and at Philadelphia at 4 o'clock next morning, the 30th; it rained hard all day, terminating at 7 o'clock, P. M. During this whole day, the wind at Nashville and Cincinnati blew towards Philadelphia, and at Flushing, Middletown, Providence, and Portsmouth, directly towards Philadelphia also. This storm lasted eight hours at Nashville, fifteen hours at Philadelphia, twenty-four hours at Flushing, and twenty-seven hours at Portsmouth. The wind set in at all these places some hours before the rain from the north-east, and at the termination of the rain changed to the south-west; and before it ceased raining at Portsmouth, the wind had changed round by south to west at Flushing and Philadelphia, and to the south-west at Middletown.

Even one well authenticated case of this kind goes far to establish the fact that the wind below blows towards the centre of a *great* rain. From the time of the middle of the storm at Nashville, until the middle of the storm at Philadelphia, was $23\frac{1}{2}$ hours, and this corresponds well with the fluctuations of the barometer mentioned before.

It may be mentioned also, that, reckoning from middle to middle of the storm, it was $30\frac{1}{2}$ hours from Nashville to Middletown, and $32\frac{1}{2}$ from Nashville to Portsmouth. These all agree in giving a velocity to this storm of about twenty-six miles an hour. *Is this the velocity of the upper current of air at Philadelphia, which comes generally from a point south of west? Is it this upper current which gives direction to the storms in this latitude?*

Many instances have been observed upon a momentary breaking of the lower clouds, in the very middle of these north-east storms, when the clouds above were coming from the south-west.

This storm had a north-east and south-west diameter, at Nashville, of about 200 miles, gradually increasing in size, until, at Portsmouth, it was 800 miles. Its north-west and south-east diameter is unknown.

What are these two diameters of storms generally?

Our correspondents will perceive that something on this subject is likely to be discovered by a persevering course of simultaneous observations over our wide extended continent. The Joint Committee which now addresses you will spare no means to elicit from your observations, decisive answers to the queries proposed above, and, if possible, to establish such general laws as will entitle meteorology to the name of science.

To this end, it is essential that the original observations, and not the mean of several, should be communicated, and that the number and extent of our correspondents should be increased; we therefore request each one of our correspondents to procure at least two more. It would be very desirable to have different correspondents at places along our northern frontier, and others on our sea-board, from Cape May to Cuba. Also to have some correspondents in the *far west;* we have none at present farther than Nashville.

The committee earnestly request that the present opportunity of discovery may not be lost, that the undertaking may not languish for want of zeal; their correspondents may be assured, even when the committee is silent, that they are constantly at their posts, waiting for the communications with that intense interest which always accompanies sanguine hopes of successful investigation.

James P. Espy, *Chairman Joint Committee.*

Charles N. Bancker,
Gouverneur Emerson, M. D.
Alexander D. Bache,
} *Com. of Amer. Philos. Soc.*

James P. Espy,
Alexander D. Bache,
Henry D. Rogers,
Sears C. Walker,
Paul B. Goddard, M. D.
} *Committee of Franklin Institute.*

Medals to be awarded by the Royal Society, for Discoveries in Physical and Mathematical Knowledge.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—In pursuance of the directions of the American Philosphical Society, I send to you, for publication, the accompanying copy of a letter from the Foreign Secretary of the Royal Society of London.

Respectfully, yours,
A. D. Bache,
One of the Secretaries Am. Philos. Soc.

ROYAL SOCIETY OF LONDON,
Somerset House, March 1st, 1835.

SIR,—I am directed by his Royal Highness, the President, and Council, to acquaint you, for the information of the American Philosophical Society of Philadelphia, that his Majesty, the King, has been pleased to grant two gold medals, of the value of fifty guineas each, to be awarded by the Royal Society, on the day of their anniversary meeting in each succeeding year, for the most important discoveries in any one principal branch of physical and mathematical knowledge.

His Majesty having graciously expressed a wish that scientific men of all nations should be invited to afford the aid of their talents and researches, I am accordingly directed by the Council to announce to you, sir, that the royal medals for 1837 will be awarded in that year, the one to the author of the best paper to be entitled, "Contributions towards a System of Geological Chronology, founded on an examination of Fossil Remains, and their attendant phenomena,"—the other, to the author of the most important unpublished paper in physics, which may have been communicated to the Royal Society, for insertion in their Transactions, after the present date, and prior to the month of June, in the year 1837. In case no paper on the geological subject above specified, or none possessing sufficient merit, is communicated to the Society for insertion in their Transactions, after the present date, and prior to the month of June of 1837, the Council propose to adjudicate one of the royal medals of that year to the author of the best paper on any other subject in geology, or mineralogy, that may have been presented for insertion in the Philosophical Transactions, within the same period previous to the time of award.

I have the honour to be, Yours, &c.

CHARLES KONIG,
For. Sec. R. S.

FRANKLIN INSTITUTE.

Monthly Conversation Meeting.

The seventh conversation meeting of the Institute, for the season, was held at their Hall, April 23d, 1835.

Mr. Thomas Ewbank, of New York, exhibited a series of experiments on the rarefaction produced in the air within a tube, by blowing through another tube inserted into the first; the tubes were variously connected, and proportioned in dimensions, and the degree of rarefaction produced in each was measured by the rise of a column of water into the tube.

Mr. Ewbank showed that this principle might be applied conveniently to syphons, the flow of water through them being commenced by blowing through a lateral tube. He also exhibited a syphon, the shorter leg of which terminated in a tube, widening as it receded from the bend, and which was filled by stopping the longer leg with the finger, and immersing the other leg of the syphon in a liquid; on

the removal of the finger, the momentum of the liquid carried it up the shorter leg, passing the bend.

Messrs. Lehman & Duval, of Philadelphia, exhibited various specimens of lithography, drawn and printed at their establishment.

Prof. W. R. Johnson showed an apparatus intended to illustrate the principle upon which rockets ascend, and to show that such ascent might take place in vacuo, and, therefore, could not be produced by the reaction of the gas, issuing from the rocket upon the air without. The apparatus consisted of two revolving arms, with opposite apertures, like those of Barker's mill; this was placed in an exhausted receiver, and set in motion by admitting air through the apertures into the receiver. The arms were furnished with broad wings, presenting a large surface to resist the motion through air. The velocity was perceived to be greater, as the vacuum was more perfect.

Committee on Science and the Arts.

Report on Messrs. Little & Elmer's Chronometer.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Chronometer, constructed on a plan invented by Messrs. Little & Elmer, of Bridgeton, Cumberland county, New Jersey, REPORT:—

The following description is given by Mr. Little, one of the inventors.

To Mr. W. H. C. Riggs:

Sir,—Your letter of the 9th instant was duly received. I would cheerfully furnish you with a copy of the specification; it is somewhat lengthy, and refers to the drawings, on which account, perhaps, it would be more satisfactory for you to take the chronometer to pieces. You will perceive that all the escapement, except the escape wheel, is attached to the upper plate; and if you put in the balance, I think it cannot fail to be understood, as then all that is new will be clearly and distinctly seen. I would suggest that you notice that the train is lower than the train of the common chronometer; consequently, more power is carried to the balance, with the same maintaining power.

My seconds wheel has	60	ratio 5.
Escape wheel pinion,	12	
Escape wheel,	12	

which gives 60 impulsations in a minute, and four semi-vibrations for one impulsation; consequently, the balance stands detached double the space of time.

Common Chronometer.

Seconds wheel,	80	ratio 8.
Escape wheel pinion,	10	
Escape wheel,	15	

which gives 120 impulsations in a minute, and two semi-vibrations for one impulsation. Both trains make 14,400 semi-vibrations in one hour.

It is well known to practical men, that there is great difficulty in making the locking spring; if too strong, it takes too much power from the balance, and is liable to derange its natural scale of forces; if too weak, it is liable to be destroyed, and requires the greatest address in the workman to make it safe. In mine, the unlocking is performed by a compound lever, which enables me to make the spring more easily and perfectly safe; consequently, this escapement (although it has more pieces) is more easily made, and more safe than the common chronometer escapement; the spring is to the balance what gravity is to the pendulum, and, like the pendulum, the balance has a natural scale of forces, which must be more or less disturbed at every impulsation. In my escapement, the impulse is given at every second, whereas, in the common chronometer, the impulse is given twice in a second, and, in some, five times in two seconds; consequently, my balance stands detached more than twice as long as the common chronometer, and the scale of forces is less frequently deranged. That the arcs of the four semi-vibrations will differ in their lengths, is certain, but they are periodical every second; consequently, the seconds will be isochronal among themselves. You are at liberty to take the chonometer to pieces, and lay this communication before the committee. As the inventor and maker of this escapement, I have written this in my own name.

I am, &c.

ARCHIBALD LITTLE.

By permission of Messrs. Little & Elmer, the committee examined the instrument submitted to them in detached parts, to ascertain whatever was new in its construction. They considered the workmanship of the whole instrument as highly creditable to Messrs. Little & Elmer, and pronounced their opinion without hesitation, that chronometers on the plan of that submitted to them, might be made to keep excellent time. The escapement was evidently original, and very ingeniously constructed. It does away with some of the inconveniences common to all other escapements; but, while it removes some of the difficulties that interfere with the perfection of chronometers, it introduces others, which the committee apprehend are nearly, or quite, as formidable.

Messrs. Little & Elmer's statements of the number of impulses are correct; but there is no reason to think that the moving power is diminished, and it is questionable whether the jarring of the chronometer is less, from having this power communicated by half the number of impulses. Moreover, a new wheel is introduced, and the danger of variation of rate from a variation of friction, is thereby increased.

A statement of the rates of No. 2, during the months of March, April, and part of May, is herewith submitted.

By order of the committee.

WILLIAM HAMILTON, *Actuary.*

Report on Messrs. M'Mullin & Hollon's Knitting Machine.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a machine for knitting stockings, invented by Messrs. M'Mullin & Hollin, of Sinking Valley, Huntingdon county, Pennsylvania, REPORT:—

That the model submitted for their examination consists of a frame about one cubic foot in dimensions, a sliding bar, or carriage, in length somewhat greater than the breadth of the intended fabric, lying along the front of the frame. An axle, or shaft, parallel to, and back of, the carriage, from which the several motions are derived, extends across, and is supported in opposite sides of, the frame. On the upper side of the carriage, along its whole length, and pointing upwards, is a row of teeth, or comb, to receive the loops of the stitches as they are formed.

The movements of this machine are simple, consisting merely in a short motion of the carriage at every stitch, whilst the thread is carried forward and back, so that, passing the tooth on its foremost side in going forward, and behind it on its return, it laps the thread around it, and in throwing off the previous loop, to form the stitch; also, in a contrivance for reversing the motion of the carriage at the edge of the work. All of which are derived from the shaft above mentioned.

There is some difficulty in describing the parts employed in forming the stitch, without reference to drawings. The principle, however, is the same as that of the common hand knitting, a single row of loops remaining always on the comb, and the operation proceeding from loop to loop, as they are presented in succession across the end of the work, the thread being first lapped around above the loop, when the loop is taken up by a small hook, and carried over the top of the tooth, and dropped on the other side, which completes the stitch, the lap of thread being prevented from slipping off the tooth, by a very short hook on the end. The hook which throws off the loop, is made to descend until its point is presented under the loop, when it again rises, retreating a little from the top of the comb, to avoid the upper thread, and the top of the tooth, when it is clear above the tooth; it then advances a little forward of it, at the same time leaning or tumbling forward until it drops the loop, and then returns to its place.

The work proceeds from side to side with great rapidity, and reverses its motion at the proper time. This change takes place when the carriage has advanced far enough to bring a check piece (which it carries with it) into contact with a shifting side cam, on the middle of the shaft, immediately back of the knitting hook.

The check piece is movable at the will of the operator, for the purpose of varying the width of the work, according to the intended shape. It has an arm, reaching forward to shift the position of the finger, or thread bearer, as it is brought up against it at the end of the motion, and is lodged against a tooth of the comb.

The movement of the carriage is caused by the before mentioned side cam, operating successively upon the teeth of a rack attached to the carriage, and is either towards the right hand, or the left, according to the position of the cam, which is reversed as it arrives at either end of its journey.

The advantages of this machine, as set forth by the inventor, are, the use of *power* in propelling; the employment of *children* to attend their operation; and greater facility in shaping the work, besides producing firmer and more even fabrics.

The committee consider the invention to be creditable to the author, and important to the public, being ingenious and simple in its construction, and possessing some, if not all, of the advantages anticipated by its inventor.

Being thus favourably impressed, the committee beg leave to recommend to the Managers of the Franklin Institute, to award to Mr. John M'Mullen, a premium of twenty dollars, and a medal from the Scott legacy fund.

By order of the committee.

William Hamilton, *Actuary.*

May 14th, 1835.

Report on Holcomb's Reflecting Telescopes.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, two reflecting telescopes, made by Mr. Amasa Holcomb, of Southwick, Hampden county, Massachusetts, REPORT:—

That the following description of these telescopes is given by Mr. Holcomb:

The two reflecting telescopes now submitted by the subscriber, are constructed on the plan of Sir William Herschel, having the front view. The largest has a focal length of $9\frac{1}{2}$ feet; the diameter of the speculum is $8\frac{1}{2}$ inches, and has five astronomical eye-pieces, and one terrestrial eye-piece, for showing objects erect; the lowest power is 57, the highest 900. The smallest has a focal length of 7 feet 9 inches; the diameter of the speculum is $6\frac{1}{2}$ inches, and has one terrestrial, and four astronomical, eye-pieces; the lowest power is 60, the highest is 600. They are of the same kind as those that were submitted a year ago, except the manner of mounting, which is very different.

Amasa Holcomb.

On the evening of the 4th of May, the committee met, by appointment, in an open lot south of the Pennsylvania Hospital, for the purpose of testing the performance of the telescopes, which had previously been tried by some of the members of the committee, and by other gentlemen, on the evening of the 2d. The result of the examination was highly creditable to Mr. Holcomb, and cannot fail to gratify all who have at heart the advancement of astronomical science in this country.

The instruments, with powers varying from 50 to 600 in the small-

er, and to 900 in the larger, gave satisfactory views of the moon with a sufficiency of light.

Mr. Holcomb's ability to manufacture telescopes which should bear a comparison, on favourable terms, with the best four and five feet achromatics now in the country, having been established by the report of the committee in May, 1834, their attention was chiefly directed to ascertaining the degree of perfection to which he has attained in his art, by his persevering efforts during the past year. Accordingly, the remarks which follow are made with reference to the larger telescope, of about ten feet focal length, eight inches aperture, and with a positive eye-piece, giving a power of about 900, and the surface of the field of view nearly twice as great as that of a Gregorian, and one-third greater than that of an achromatic telescope, under similar circumstances.

The view of the moon with its rugged surface, its ridges of mountains, and the endless variety of indentations on its surface, was interesting beyond description, and exceeded any thing of the kind the committee have ever witnessed.

Saturn's ring, though not in a favourable position, was seen manifestly double, for the first time in this country, as far as the information of the committee extends.

The companion of Polaris appeared as a star of the fourth or fifth magnitude, to the unassisted eye.

The double stars, Castor, μ Draconis, 4 and 5 ϵ Lyræ, and 44 Bootes, were distinctly separated, and the dark space between them made evident. The last mentioned, consisting of two stars of the fifth magnitude, distant 3″ made a fine appearance; they were soft, and well defined, and there were no scattering rays of light, as was the case with Castor, in both instruments.

A class of closer double stars, of which 6 Coronæ, distant 1″.2., and ζ Bootes, distant 1″.4., may serve as examples, was acknowledged by the artist, last year, to be too difficult for his telescope. This has furnished a stimulus for his exertions, and the complete division of the latter, as witnessed by the committee on the present occasion, has been the reward of his disinterested labours. The discs of the two stars in ζ Bootes appeared to be tangent to each other. The committee have no evidence that the same has been effected by any other telescope in the country.

For the purpose of finding the limit to the power of Mr. Holcomb's telescope, the committee called his attention to a class of still closer stars; among them were mentioned, ζ Cancri, μ^2 Bootes, η Coronæ, 36 Andromedæ, and ϵ Arietis, the last of which is only divisible by two telescopes now in use, viz: the Dorpat telescope, and the twenty foot reflector of Sir John Herschel. These stars, distant from 0″.6. to 1″.0., are made to appear with their discs tangent to each other in those celebrated instruments, as appears by their notes appended to the observations contained in their printed catalogues. It is almost needless to add, that Mr. Holcomb acknowledged these stars to be too difficult for any telescopes he has yet made.

It may seem presumptuous to compare the small instrument of

Holcomb with the chefs d'œuvre of British and German genius; but, thanks to the admirable labours of the Herschels, of Struve, and of South, observers are enabled, through their printed catalogues, to compare together the optical capacities of their telescopes in distant regions. Accordingly, it appears from an examination of these catalogues, and of Holcomb's instruments, that what the best telescopes in Europe can do upon stars distant 0''.6., can be done upon stars distant 1''.4., by instruments which are the work of an unassisted, and almost neglected, American optician.

Judging from the progress made in his art, by Mr. Holcomb, during the past year, the committee look forward, with confident expectation, to the not far distant period, when, should his health be spared, the country will be in possession of a twenty feet reflector, of native workmanship, rivalling the best European instruments, and that, too, without the patronage of any corporate institution, should all of them be willing to waive the opportunity of sharing with him the merit of such an enterprise.

The committee have been led to enlarge upon this subject, from a knowledge that one of our national institutions has, within a few years, imported into the country, at an expense of $2,500, a telescope which, though excellent in its kind, is inferior to that exhibited by Mr. Holcomb, which was made and mounted to order for an individual in Georgia, at less than the eighth part of the above mentioned sum. It is not probable that a twenty foot instrument from Mr. Holcomb, would cost eight times as much as one of the length of ten feet.

The mode of mounting the instrument appears to be original, and nothing can exceed it in simplicity, or steadiness. Indeed, with a power of 900, no inconvenience was perceived from resting with one hand on the frame, and another on the tube, although the same could not be done with the mounting used by Mr. Holcomb last year, or with that of common achromatics with a power of 200, without serious inconvenience.

In conclusion, the committee beg leave to recommend Mr. Holcomb to the Board of Managers of the Franklin Institute, as a candidate for a premium and medal from the Scott's legacy fund, for his new mode of mounting reflecting telescopes.

By order of the committee.

William Hamilton, *Actuary.*

May 14*th*, 1835.

Committee on Premiums and Exhibitions.

Report of Experiments made by request of the Committee on Premiums and Exhibitions, on Bene Seed Oil, furnished at the eighth Exhibition of the Franklin Institute, by Wetherill & Brothers.

In November, 1833, several bottles of bene seed oil were furnished the Committee on Premiums and Exhibitions, with a view to have determined, by experiments, the value of this article in the manufacture of wool, and particularly for painting in and out doors work, as

a substitute for linseed oil. The following are the reports made by those to whom this oil was furnished for experiment.

Experiments on its Use in Manufacturing Wool. By George Wall.

The bottle of bene seed oil received for the purpose of essaying its usefulness in the manufacture of wool, has been tested as far as practicable with so small a quantity, being necessarily confined to a small lot of a particular kind of wool.

It was put on a lot of fine merino wool, which has considerable animal oil in it; this I thought not unfavourable to a full experiment, and particularly in respect to the glutinous substance which it was thought to contain, and which is, perhaps, the only objection which the manufacturer will find against its use. The quantity of this oil used was the same as that of sperm, or olive, for the same quantity of wool.

The only object of using oil in the manufacture of wool, is to make it work more freely in the carding and spinning; and those who performed that part of the work, are of the opinion that it worked as freely as that oiled with good sperm, or olive oil. In the process of extracting the oil from the cloth, or scouring, as it is usually called, it was found that this oil required more expense of materials and labour than the oils commonly used by manufacturers; this is a strong evidence that it contains more glutinous matter, which would be highly objectionable in the manufacture of some kinds of cloth, and particularly those of delicate colours, as the process of scouring would be very likely to injure them; but where the extra expense is the only objection, as it would be in the manufacture of many kinds of goods, it must be considered of minor importance.

After carefully observing all the different operations, from the wool to the cloth, and examining it in all its different stages, I am inclined to believe that this oil will answer a valuable purpose in the manufacture of many kinds of woollen goods, but I cannot speak with entire confidence without testing it in a larger quantity, and on different kinds of wool.

Philadelphia, April 15th, 1834.

Experiments, by M. Shove.

Having received a small quantity of vegetable oil, I have endeavoured to ascertain its effects on wool, in the various operations of manufacturing.

I have ever deemed it desirable, in the application of oil on wool, that it should spread itself thinly over the surface, so that, if possible, every fibre should have an exceedingly small portion; the vegetable oil sent us appeared to do so about as well as summer strained sperm oil.

So far as relates to the operation of carding, I should think it might answer for coarse wool, provided it was used immediately after being applied, but when suffered to remain several days, a crusty

envelope seems to form, which is very detrimental in the process of carding.

Whether a greater portion of this oil is absorbed, or exhaled, than sperm, I know not; but the circumstance of the crusty formation is still more prejudicial in the process of spinning than in carding, or in any other operation.

It evidently appeared to me that this oil was more difficult to discharge than sperm oil, requiring more and stronger soap—consequently, more expense.

The peculiar smell of this oil seems to be retained after scouring; as this would be an insuperable objection to its use, I took particular pains in this respect, and thus, after repeated scourings, found that the wool was not divested of the odour, which is something similar to that of linseed oil.

Being mixed in about equal parts with lamp oil, I could not discover, in burning, any perceptible difference in the light, but thought it consumed a little faster; I was not positive, however, in this respect, as it was not marked precisely, and I had not enough left to make another trial.

I regret that the result did not prove as favourable as the sanguine wishes and hopes of the friends of American industry and improvement could desire.

Experiments on the Use of Bene Seed Oil, in Painting on Out Door Work. By CHARLES WETHERILL, *and* J. G. HARKER.

In November, 1833, J. G. Harker had a post in his yard painted, part with bene seed, and part with linseed, oil; at present, both present the same appearance; both dried quickly.

In the early part of October, 1834, J. G. Harker had other out door painting done with the oil of bene; on this occasion, the paint was mixed and prepared for painting by C. Wetherill, who, with a view to ascertain its drying property, mixed the paint without the usual quantity of drying. The paint was laid on the work on Saturday evening, and although it rained previously to Monday, it was dry on that day, and now looks well; and from every opinion, upon close examination, we do believe that this oil will answer a valuable purpose for out door work.

The report on greasing wool and machinery, we believe, is before the Committee of the Franklin Institute.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN DECEMBER, 1834,

With Remarks and Exemplifications, by the Editor.

1. For a *Screw for Propelling Canal, and other Boats;* William Burk, Whitemarsh, Montgomery county, Pennsylvania, December 2.

The specification of this patent is, very properly, quite brief, for

as the thing patented has, in numerous instances, obtained the same sanction, and many descriptions of it are to be found in the files of the office, it would have been a waste of words to have repeated the whole story in all its longitude.

"The machine is on the principle of a screw, the worm, or thread, as it may be termed, being made to wind round a small shaft, one, two, three, or more times, as will best suit the motions of the machine. The size of the screw to be regulated by the size of the boat. The machine is intended to be applied to either end, or both ends, or both sides, or in the middle, of the boats intended to be propelled. This machine has an advantage over all others as to facility, and passing through the water with the least agitation." So says the patentee, but if we are to be guided by the result of experiment, repeatedly made, we shall be compelled to pronounce it to be one of the least efficient of all the plans tried. Who was the first inventor, we have not sought to learn, but it was patented in this country as long since as 1815, if not earlier, and there is a full description of the same thing in the "Annals of Philosophy" for 1818, vol. xi., p. 138.

Were our canals and rivers filled with some semi-fluid, having a good portion of tenacity, these screw propellers might travel onward without scattering or communicating a rotary motion to it, as they do to water, whilst the boats to which they have been attached, have advanced with no more than a snail-like speed.

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2. For *Saw Mill Dogs;* Phineas Bennet, Hector, Tompkins county, New York, December 2.

Although this patent is taken for saw mill dogs, we do not find any thing new in the description of this part of the appendage to the saw mill, the contrivance described consisting in a mode of setting the log by the working of a pinion in a toothed rack fixed upon the head block. The shaft upon which the pinion is placed is to be turned by a lever, and has on it also a ratchet wheel, on which the lever acts. A method of rendering the apparatus self-acting, is described and represented, but there is not any claim made, and we are consequently left entirely to conjecture respecting what part of the contrivance the patentee considers as of his invention.

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3. For an improvement on the *Movable Sinks,* invented and used in Paris; Peter Barthlemy, city of New York. An alien, who has declared his intention to become a citizen of the United States; December 2.

This is an invention dedicated to Cloacina, a goddess to whom temples are erected even in christian lands, but whose rites are generally performed in secret, and alone. Whether or not the patentee has really improved upon the Parisian mode of conducting them, is a question the discussion of which we shall postpone, and that probably *sine die.*

4. For machinery for *Sifting and Cleaning Grain, &c.;* Martin N. Armstrong, and William H. King, city of New York, December 2.

Were all the specifications in the Patent Office drawn up in the style of that before us, we should be compelled either to relinquish the task of examining their contents, or of purchasing a right to some literary winnowing machine, which would separate a grain of wheat from a bushel of chaff, if any such there be. We have conned over the eighteen pages of the aforesaid specification, and are still unable to tell what is said upon the subject; but we have learnt that the said machine consists of a cylindrical screen, and certain other contrivances for effecting the proposed object. The cylindrical screen, placed like a bolter, is double, containing one wire work cylinder within another, and within the inner cylinder a fan, furnished with four wings, or vanes, the shaft of which is in the axis of the two cylinders, and which fan is to revolve in a direction the reverse of that of the cylinders. The grain, or berries, &c. &c. operated upon, are, after being subjected to the action of this screen, to pass into a riddle, or vibrating box, worked by cranks, where the heavier and lighter bodies are to be separated from each other by a centrifugal, combined with a vibratory, motion.

There are separate claims made to the respective parts of the apparatus which are brought successively into operation, but we have spent so much time in gleaning a few scattered ideas from the "full, clear, and exact" description, that we have none to spare for epitomizing, and examining into the validity of the claims made.

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5. For a machine for *Moulding Brick;* William C. Grimes, York, York county, Pennsylvania, December 2.

(See specification.)

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6. For a machine for *Pressing Brick;* William C. Grimes, York, York county, Pennsylvania, December 2.

(See specification.)

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7. For a *Spring Carry-all;* Frederick Shelton, Jackson, Northampton county, Pennsylvania, December 2.

There is much complexity about this carry-all, and much obscurity about the description of it; and although it is very well represented in the drawing, we are unable, from the whole, to discover the intention of the patentee. We perceive, however, that it derives its name of spring carry-all, from its having four springs, like those of a pole lathe, which extend along under the roof of the carriage, having on their vibrating ends, crank rods, or pitmen, which descend down, and are operated upon by cranks upon the shafts of the wheels, each of which has two, one near each end; these springs are, we presume, to aid the motion of the wheels, by their action on the cranks, which stand at right angles to each other; the wisdom of this contrivance is equalled, if not surpassed, by another, which is certainly quite novel.

The bottom of the carry-all is to have a trap-door, or opening, in the middle, to give the driver an opportunity of walking on the road, whilst the roof is still over his head to protect him from the inclemency of the weather. There are some other improvements described, the whole of which exhibit the same degree of Archimedian talent with those already noticed.

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8. For an improvement in the machinery for manufacturing *Wrought Nails and Spikes;* Henry Burden, Troy, Rensselaer county, New York, December 2.

This patent is taken for improvements on a machine invented by Mr. Burden, and patented on the 26th of May, 1825. The improvements consist in the manner of forming and using the heading dies, a full explanation of which would require a reference to the description and drawing of the original machine. One of the improvements, it will be seen by the subjoined claims, consists in substituting chilled cast iron for steel, in a part of the dies, these having been found to wear longer, and being easily replaced.

"What I claim as my invention, is the method of forming the heads of the nails, or spikes, in a steel box, as above described. I would here also remark, that, no matter whether the box be made of cast iron, or other metal, whether in two or more pieces, whether formed in part of the dies, &c. &c., so long as the chamber, or hole, is so constructed as to admit the header to play tight, and at the same time freely, similar to the piston of a pump, or steam engine. Secondly, I claim as my invention, the use of cast iron side steels, chilled on their edges, as described above, in lieu of their being made of steel, as described in my specification of May, 1825. My claim extends to what is commonly called *cast iron*, no matter how it is hardened, although I prefer chilling or hardening it in a cast iron block."

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9. For machinery for *Doubling, Twisting, Reeling, &c.;* Samuel M'Cauley, Flattston, Beaver county, Pennsylvania, December 2.

This machine the inventor calls "An Interverting, Intertwining Spinning Reel, for doubling and twisting yarn and thread, for wrapping wire, and for spinning silk thread from the cocoon." The machinery described is placed in a frame of small dimensions, and is intended for domestic use. The variety of purposes to which it is to be applied, are scarcely compatible in one small machine, more especially when used by persons of but moderate skill; it may well be doubted, therefore, whether this intention will ever be fulfilled. Some pains have been taken in the description, but yet some of the essential parts which are referred to are not distinctly explained, the drawing being small, but indifferently executed, and not representing any thing in detail. The claims are to the arrangement of the different parts as described, to suit domestic purposes; the manner in which the dead spindle and spool are operated upon, and the use of the tube of flyers, when the flyers are off, as a condenser tube for

drawing wool, and preparing it for spinning; the drilled eyes and tube from the doubling spindle, and the shifting spindle with cups for wrapping wire, or cord; the principle on which the reel counts the threads, &c. &c.

The model is referred to, and depended upon for illustration, as is too frequently done in specifications.

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10. For *Making Pitch;* Henry Ruggles, city of New York, December 2.

The pitch is to be made from the material called "refuse," which is left after the preparation of gas at those works where rosin is employed. This refuse is a dark coloured liquid, which is first to be boiled, to drive off all the volatile, or spirituous, matter which is contained in it; after which it is to be mixed with common rosin, brought to a fluid state in a suitable vat. The hardness of the pitch will depend upon the length of time during which the refuse has been kept boiling. The claim is to "the exclusive privilege of mixing the liquid called 'refuse' with rosin, for the purpose of making pitch."

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11. For *Circular Tenter Bars;* Stephen R. Parkhurst, Providence, Providence county, Rhode Island, December 2.

The whole title is, "Circular tenter bars, for the tentering and drying all kinds of woolen and cotton goods;" and the contrivance appears to be a very good one, performing, in a small space, what, by the ordinary method, occupies considerable room. The apparatus consists of two wheels upon a shaft, which must be of such length as will allow the wheels to stand at such distance apart as shall be equal to the width of the cloth to be tentered; by means of a screw, the distance of these wheels may be easily regulated. Upon the inner surface of each wheel, a spiral of wood or metal runs from the shaft to the periphery of the wheel, the threads of the spiral to be about four and a half inches apart. Holes are bored through these spirals, at the distance of from two to four and a half inches apart, and through these holes there pass iron pins, which slide and turn freely in them, and have heads formed on the outer, and hooks on the inner, side of the wheel. The shaft and wheels are supported on a suitable frame; one end of the cloth is attached by hooks near and parallel to the shaft, and the edges to the spirally placed tenter hooks; after which the cloth is to be properly strained in width, by means of a screw nut, which removes the wheels farther apart. The diameter of the wheels will be governed by the length of the cloth to be received on them.

The claim is to the machine as described, for the "tentering, stretching, and drying, of cloth, by means of the hooked circular bars, and the method of adjusting and working the same. The advantages of the machine are, that it may be used in a small room—it renders the cloths even for rolling up—keeps the nap perfectly smooth, and expedites the drying."

12. For an improvement in *Fire-places and Stoves;* Elias W. Newton, Middletown, Middlesex county, Connecticut, December 3.

This improvement is said to be applicable to "fireplaces and stoves of every description, especially the kitchen, or cooking stove." The kind of stove used by the patentee is particularly described, but this is not claimed as making a part of the invention, although its arrangement is stated to be such as to render it particularly economical.

"The back of the furnace, against which the fire acts most intensely, is cast hollow, so that a space of two inches, more or less, between the plates, is water tight, having at the bottom of one end thereof, an orifice, closed with a movable stopper, for the purpose of cleaning the space when necessary. From the top to the opposite ends of the same space, extends a pipe, of suitable size and convenient length, to a reservoir, or boiler, with which it is connected by a proper joint. This reservoir, or boiler, contains water, and the bottom of it stands on a level with the top of the back of the furnace."

"I claim as my invention or improvement, the back applied or adapted in the manner above described, to ordinary fireplaces of all kinds, and to stoves of every kind, form, and description, so as to perform the various operations of cooking by boiling, of furnishing boiling water for chemical or other purposes, and of diffusing heat, all at the same time, and, when required, in a kitchen, laboratory, or other apartment."

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13. For *Rail-road Tracks and Wheels;* Edward C. Hyde, Natchez, Adams county, Mississippi, December 3.

We have here an old story, with some additions, but no improvements. To enable cars to ascend inclined planes, there is to be fixed to the axles, either at their centres, or at each of their ends, cogged wheels, which are to mash into corresponding cogs on the track. The cogged wheels are to be of smaller diameter than the ordinary wheels, the rails being so placed as to correspond with them. Thus far, the patentee has reinvented, or repatented, what has been several times previously invented and patented. There is something novel, however, in the form, or rather in the forms, of his cogs, but these forms are very indefinitely explained. To engineers, however, there will be no loss from this cause, as their mathematical and practical knowledge have been better teachers than the patentee, who, in the example before us, is equally distant from correctness and clearness. That we may not be supposed to misrepresent, we give his own words.

"These cogs to be made half round, half oval, or of a conical shape, alternating with corresponding half round, half oval, or conical spaces, made to match similar cogs and spaces on the tracks. These cogs on the wheels may be made on plane or bevilled sur-

faces, and of any size required, those of the tracks and wheels always corresponding."

"What I claim as my own invention, is the application of the cogs as a retaining and regulating power, which, by their round shape, obviate the friction of the parallel surfaces of the usual form of cogs," &c.

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14. For a *Side Saddle;* Olney Briggs, Schoharie, Schoharie county, New York, December 3.

The object in view is to convert, when necessary, a common man's riding saddle into a side saddle. The method of making and attaching the horns are particularly described, and claimed, and these methods may be in part new, but the general plan was devised and put into practice many years since, although it was not patented. About eight years ago, such a saddle, complete, was deposited in the Patent Office, but was subsequently withdrawn by the manufacturer.

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15. For the *Application of Caoutchouc to the Ropes used in Dragging Cars on Inclined Planes, &c.;* Patrick Markie, city of New York. First patented October 16th; patent surrendered, and reissued upon an amended specification, December 3.

We noticed this patent under the former date, and proposed publishing the specification; it, however, will be sufficient to observe, that the only object of the surrender was to enumerate, in the new specification, a greater number of applications of the coated, or saturated ropes, there not being any thing peculiar in the means of saturating, or coating them.

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16. For a *Press for Cotton, Hay, &c.;* Isaac Robinson, assignee of William T. Baker; the former of Portland, in the county of Cumberland, Maine, December 17.

This is the well known rack and pinion press. Upon a shaft passing through the cheeks of the press, there is to be a pinion taking into a cog wheel on the middle of a second shaft, parallel to, but in advance of, and below it, and upon this second shaft are two pinions, one near each end, taking into two racks, the lower ends of which are attached to the follower of the press. The first shaft is to be turned by means of a large wheel, having hand pins on its periphery. Such is the whole arrangement of this press, but neither to the parts, or to the whole, of it, is there any claim made.

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17. For a *Machine for Removing Weights, and Loading and Unloading Boats, &c.;* Thomas Patten, Sr., Bowling Green, Warren county, Kentucky, December 17.

The machinery described consists of two rails, or ways, placed parallel to each other, and supported by strong posts, upon which ways a truck, or car, is to run. The weight, or load, to be removed, is to be suspended below the car, and may be held in a scale, or sustained

by hooks, or otherwise. Upon the car there is a machine operating upon the principle of the common hoisting jack, the box of which may be ten feet, or of any other required length. In the drawing, the rails are represented as fixed upon a boat, or scow; but it is stated that they may be extended from a wharf, or warehouse, for loading or unloading craft. The patentee says, "My invention chiefly consists in the construction of a way for transferring heavy weights, in such manner as to allow the weight transported to swing below the way on which the car is to be moved, to which car the weight is to be attached, as already described. The invention may be denominated the elevating and transporting way, or engine."

The description and use of the foregoing apparatus are given in a very clear and distinct manner, and manifestly under a full impression that the whole plan is new.

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18. For a *Mortising Machine;* John Hassett Chandler, Worcester, Worcester county, Massachusetts, December 17.

The patentee says, "All I claim as my invention, is the groove in the piston, with the forked spring and ring with tooth and handle for turning it, with the application also of a chisel with lateral edges." Excepting in certain unimportant points of arrangement, there is but little difference between this and other mortising machines previously patented; even the chisel with lateral edges has been before applied, and is not, therefore, the legitimate subject for a claim.

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19. For machinery for *Roping Cotton, &c.;* Loys Brewster, widow and legal representative of Gilbert Brewster, late of Poughkeepsie, Dutchess county, New York, December 17.

The apparatus intended to be patented is represented very perfectly in a drawing, but there are no references to it whatever, the explicit requirement of the law in this particular having been altogether overlooked. In the specification, we are informed that "the operation of the machine is to put on, or wind, roping on a bobbin without any heads, and to make it in the shape of a cop, or bevilled at each end, so that it will remain firm on the spool in the process of handling and spinning." There is no claim made, and no indication of what constitutes the novelty of the machine, with the exception of what is contained in the foregoing quotation.

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20. For an *Easy Chair;* Benjamin Franklin Hays, Pittsfield, Berkshire county, Massachusetts, December 17.

There are in this chair a number of ingeniously devised contrivances for moving, shifting, and adapting its various parts, so as to contribute to the relief of invalids, and render it useful for other purposes; to these parts there are numerous references, which would be useless without the drawing; all we can do, therefore, is to give the claim, which will make the general intention of the contrivance known.

"What I claim as my invention, and not previously known in the

above described machine, is, 1st. Holding the back and foot pieces at any given angle, by a simple strap and buckle, or rolling cylinder, around which the strap, or cord, may be wound by a crank. 2d. The sliding pannels in the foot pieces, by means of which the chair can be made of ordinary height, and the bed of any required length. 3d. Head piece in the back, so calculated as to lengthen the back when in a chair, and shorten it when in a bed, forming a head piece when in a perpendicular position, and a head board when in a horizontal position. 4th. The side rockers with a joint in the middle, so made as to be operated on by a lever, by which an individual can raise himself by a simple and easy motion, from a rolling to a rocking chair. Cross rockers, confined by the same pivot (though not necessary) which confines the side rockers. 6th. Sliding or moving bar, to which the cross rockers are attached by rods and staples, and by the moving of which bar on the arbor, the cross rockers are folded into a horizontal, or pressed out into a perpendicular, position. 7th. Rollers, or casters, so applied as to form a check to both pair of rockers, and operating on the same pivot."

The foregoing claims are undoubtedly sufficiently distinct and particular, if they are not too much so for the interest of the patentee; from the manner in which they are made, they would seem to confine him to the precise methods represented; and from their number, there is danger that some one or more of them may have previously been used, as there is a host of similar invalid chairs here and in Europe.

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21. For an improvement in the *Construction of Bedsteads;* Benjamin Humphreville, and James King, Morristown, Morris county, New Jersey, December 17.

This improvement is said to consist of two parts, the first of which directs the making the legs of low post bedsteads in such a manner that they may turn upon a bolt, or pin, at their upper ends, so as to fold into a groove, or opening, along the head and foot rails, thus admitting of the bedstead, when not in use, being placed against a wall, so as to occupy but little more room than a wide plank. The second is in the manner of fixing the slats, which are used as a substitute for sacking bottoms. Slats are to be made to extend from one side rail to the other, but not to rest upon them, as they are to be supported entirely by the end rails. These slats are to be connected together by two ropes, in such way as to keep them at the proper distance from each other. Two iron rods, or straps, generally of hoop iron, are stretched between the head and foot rails, for these slats to lie on; in order to stretch them, screw bolts, terminating in hooks, pass through the head and foot rail, and by turning these, the required tension is given to the rods, or straps; the slats are then laid upon them, and kept in their places by fastening the cords to the hooks. The tightening screws serve as pins, upon which the legs turn.

This mode of using slats, it is proposed to apply to sofas, and a

number of other articles. There is no distinct claim made, but the two points mentioned are manifestly the things intended to be patented. Of the first item we do not think very favourably, as legs so constructed will necessarily make harbours for vermin; we are apprehensive, also, that it will be found of little utility, as the stowing away of the bed and bedding, as well as of the bedsteads, will be a very troublesome affair, unattended with much advantage in point of room.

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29. For a *Thrashing Machine;* Charles P. Tenant, and William Eaton, Wooster, Wayne county, Ohio, December 17.

"We claim as our invention, the peculiar form and construction of the machine, together with the manner of regulating the cylinder by means of two screws; and the scolloped floats."

The peculiar form we cannot perceive; the scolloped floats are the beaters of iron, with scolloped edges; and the screws are to set the cylinder at a greater or less distance from the concave.

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23. For *Smelting Iron Ore with Anthracite Coal;* Thomas S. Ridgway, Pottsville, Schuylkill county, Pennsylvania, December 17.

(See specification.)

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24. For a *Machine for Shelling Corn;* Warren Johnson, Boscawen, Merrimack county, New Hampshire, December 17.

The description of this machine is equally brief and obscure, the whole being comprised in the following words. "It consists of an upright square box, about three feet and a half high, and eighteen inches square; a hopper in the top; a feeding cylinder of wood, with springs under the grooves, and two shelling cylinders of wood, or cast iron, full of picks; a spring shoe, with a roller at the bottom, and springs to press the ears of corn against the picks; a grate of cast iron, through which the corn passes, and to cast off the cob; and below, a fan to winnow the corn. The whole moved by five cast iron cog wheels, moved by a crank. The cylinders are all horizontal."

If this is "full, clear, and exact," so would the same number of words be, if thrown together pellmell. The drawing is well executed, but presents us with a machine much more complicated than those in general use, and without any perceptible corresponding advantages.

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25. For a *Cooking Stove;* James Childs, Henniker, Merrimack county, New Hampshire, December 17.

The claims made by the patentee, are to "the passage of the fire by a single horizontal aperture through the back of the fireplace, and its equal division and draught under and over the oven, by the elevation of the cast iron back of the oven as high as the middle of said aperture, and above the top of the oven. The making the spaces remote from the fireplace, both under and above the oven, larger

than the aperture, and thereby improving the draught of the stove. Also, the enlargement of the back part of the stove by the perpendicular wing at the bottom, and the wings at the sides, whereby a larger oven is made than in any other stove of equal size, and other conveniences, and is more uniformly heated by being at a level with the fireplace, allowing the fire also to act more directly upon whatever is placed upon the orifices at the top, than in any other stove."

The drawing accompanying this specification is a very imperfect affair, not representing many of the parts described, and several of the figures are without written references; we cannot, therefore, undertake to express a judgment either of its novelty or utility.

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26. For *Stone Hammers;* Galen H. Pierce, Middleborough, Plymouth county, Massachusetts, December 17.

These stone hammers are to be made of iron, with a deep groove at each end, to receive steel dies. The dies are to be fixed in their places either by screws, or by a taper pin. When screws are used, there are to be three, two of which pass through one of the iron cheeks, and are tapped into the die, the third, or middle one, being tapped into the iron cheek, and bearing with its end against the die. When a pin is used, a hole is to be bored between the pin and the die, from end to end of the groove, one-half in the steel, the other in the iron; this hole is to be tapered, and a pin driven into it fastens the die in its place. The claim is to "the mode above described of fastening the dies or blades into the eye, or head piece, of a hammer for cutting stones."

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27. For a *Lath Machine;* Siba and Caleb Howard, Plymouth county, Massachusetts, December 17.

"We claim as our invention, the application of one or more horizontal [circular] saws, so placed that laths may be sawed from a block of wood at one operation, as described above. We make the large upright saw about thirty inches in diameter, and the horizontal saws about seven inches.

"The frame upon which the block from which the laths are to be sawed is fastened, is moved up toward the saw the width or thickness of a lath each time the carriage returns to its first position, by a rack and setting dogs in the usual way. The teeth of the rack are varied, so that the laths may be sawed edgewise or flatwise, as may be desired. We claim no other parts of the machine than the horizontal circular saws, and the fixtures necessary to their operation, as described above, by which laths may be sawed completely at one operation."

In vol. xi., p. 319, there is the specification of a patent for cutting laths by means of circular saws, operating simultaneously on the edges and sides. In the only point claimed, therefore, the patentees have been anticipated.

28. For an improvement in the *Lay of the Power Loom;* Benjamin Brooks, Newmarket, Rockingham county, New Hampshire, December 17.

The improvement is in that part of the lay which is called the reed binder, and consists in the application of spiral springs in such a way as to equalize the pressure which may be obtained between the reed binder and the reed, and causing the pressure to be applied with facility to any part of the length of the reed; "the springs being so placed as to be out of the way of the other parts of the loom, and not so liable to be affected by changes in the temperature of the weather, as the springs in use for the same purposes." The claim is to "the application of spiral springs to the reed binder in the power loom, in the manner above described, or in any other convenient manner." The description is very clear, and well exemplified in the drawing, without which it would not be easy to convey a correct idea of the particular plan adopted.

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29. For a *Washing Machine;* William C. Kniffin, Alexander, Genesee county, New York, December 17.

This washing machine consists of a box, or trough, in which two pistons, or dashers, are worked up and down by means of a horizontal lever, vibrating on a fulcrum above the centre of the box. The dashers are fluted on their under sides, and there are corresponding flutes on the bottom of the box. There is no claim.

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30. For a *Machine for Planting and Covering Corn;* Thacker V. Bush, Clark county, Kentucky, December 17.

This machine is intended to lay off the ground, drop the grain, cover it, and rake the ground; the patentee, after describing it, claims "the foregoing machinery made in the manner, and for the purposes, hereinbefore described," without designating any particular part as new. Was the general arrangement of the instrument altogether different from all those which have been previously contrived for the same purpose, such a claim might be a good one, but this is very far from being the case; the hopper, wheel, rakes, share, or hoe, and their mode of operation, have little in them that is new, and do not, therefore, require particular notice.

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31. For a *Machine for Dressing Staves*; Asahel Fairchild, Queensbury, Warren county, New York, December 17.

This machine consists of a hollowing and a rounding plane, which are to be made to traverse horizontally, by means of cranks, upon the shaft of a fly wheel. The particular arrangement of the respective parts is not described, and the claim is simply to "the application of hollowing and rounding planes, when moved by power other than the hand, to the shaping and dressing of staves."

Such a machine cannot be applied, excepting to such staves as are perfectly straight, and there are certainly many machines previously

patented which will not only work more rapidly than this, but which are applicable to staves that could not be dressed by it.

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32. For an improvement in *Ovens;* Samuel S. Eaton, Mansfield, Tolland county, Connecticut, December 17.

The ovens here patented are to be placed above the fire, in the back wall of a common fireplace, with a cavity large enough to receive the oven, and to allow of a two inch flue under, back of, and around it. The oven is to be a rectangular box, which may be two feet long, one foot in height, and the same in depth. The front of it is to be closed by a door, hinged at its bottom edge to the lower plate of the oven. There are to be dampers, or valves, to close, either wholly or partially, the opening of the oven flue, below the door. The claim is to "the application of ovens to common and ordinary fireplaces, to obtain heat without any additional expense of fuel, or labour to create a fire."

There must be something more in these ovens, or fireplaces, than is described, or represented in the drawings, or they will not only be very inconvenient, but altogether inefficient. An oven door behind and above the fire, in a common fireplace, appears to be a most awkward contrivance; and by what means the flame and heated air are, at any time, to be induced to pass round the oven, does not appear, as the ordinary flue, above the oven, is represented as entirely open, leaving a free passage to the draught directly into it, at all times. We presume, however, that it is intended to close it by a damper, or register, although nothing is said about it.

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33. For an improvement in the *Manufacturing of Sheet and Boiler Iron;* John M'Nary, Brooklyn, Kings county, New York, December 17.

Iron is to be cast in plates of a proper size, and is then to be annealed, in the manner now practised both here and in Europe; after annealing, it is to be rolled out in the ordinary rolling mill, to the proper thickness. The claim is to "the use of malleable cast iron, in the above described manufacturing of sheet iron and boiler plate."

Without stopping to discuss the validity of the claim, we are compelled to doubt the success of the process. That such iron may be rolled out, we are well aware; but we do not believe that it will possess the tenacity of good boiler iron, made in the ordinary way, and without this it will be of less than no value in its application to steam boilers.

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34. For an improvement in the art of *Manufacturing Scythes;* Augustus H. Searle, Indianapolis, Marion county, Indiana, December 17.

This improvement "consists in sinking the back part of the web by means of steel dies, confined in hammers, operated by water or steam power, in such manner as shall produce a small shoulder, or stay, on each side of the web, and is, in effect, a second back, or stay, on each

side of the scythe. Two sets of dies, models of those I use in the manufacture of scythes, as above described, together with two scythes manufactured by the use of them, I have transmitted."

There is no drawing accompanying this patent, and the patentee, therefore, has not complied with the requirements of the law, as it is one of those cases that "admits of drawings," and, in fact, actually requires them. A section, at least, of the blade should have been furnished. Every reader must perceive that the foregoing description does not, in the absence of a drawing, inform him precisely what the patentee intends.

35. For a *Thrashing Machine;* Webber Furbish, Hallowell, Kennebeck county, Maine, December 17.

The claim is to "the cast or wrought iron beaters, set upon or into a cylinder, the form of the teeth, the arrangement of the teeth in the concave segment, and the general arrangement of the machine." Were we asked which of these claims could be sustained, we should be at a loss to designate one, as the whole machine is as much like some others as it could well be made. The drawing is very defective, and, indeed, is not worthy the name.

36. For an *Oven;* Benjamin Blaney, Boston, Massachusetts, December 17.

The oven which forms the subject of this patent is to consist of a rectangular metallic box, with a furnace below, also of metal, and capable of being drawn out, to ignite the fire. The heated air is to pass up, beside, and over, the oven, and is to descend again before it enters the flue. The whole is to be enclosed in brickwork, and particular devices are pointed out to prevent the escape of heat, in which, however, there is nothing new in principle; the particular arrangements spoken of are distinctly represented in appropriate drawings. A thermometer is to be so fixed as to have its bulb within the oven.

"The petitioner claims the general arrangement of the oven; and particularly the passing of the heat in the funnels within the brick walls, as above described; and also the application of a thermometer, which enables the operator to graduate the heat, and acccomplish with certainty the desired results."

37. For a *Machine for Hulling and Breaking Cotton Seed;* Charles Beck, and William Jenks, Columbia, South Carolina, December 17.

(See specification.)

38. For a mode and *Machine for making Wrought Nails, Tacks, or Spikes;* William C. Grimes, York, York county, Pennsylvania, December 17.

(See specification.)

39. For a mode of *Manufacturing Wrought Nails, Tacks, or Spikes*, by first preparing the material, rods, or pieces, in such a manner as greatly to facilitate the process. William C. Grimes, York, York county, Pennsylvania, December 17.

(See specification.)

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40. For *Apparatus for Applying, Abstracting, and Conducting, Heat;* John Cooper Douglass, New York, but now residing in London, December 23.

The title of this patent led us to expect much more than we find in it, the exemplifications given being principally confined to two points, with some very vague refrences to others. In the first place, a vessel is exhibited, in which either the vinous or acetous fermentations are to be carried on. This vessel is to be heated by carrying steam tubes through the lower part of it. The vapour which arises from the fermenting liquor is to be carried through a condenser, consisting of a congeries of vertical tubes, surrounded by water. "I thus save the vinous particles; the acetous particles are also thus saved, for the purpose of adding to my vinegar."

The second particular operation of the heat abstracting and conducting apparatus, is to the miner's *safety lamp*. Air is to be admitted through wire gauze at the bottom of the lamp, the light being emitted through a lamina of talc, or other transparent medium. Immediately above the wick is a tube, apparently about an inch in diameter, leading to the top of the lamp, and forming a central chimney; the top of which tube is covered with wire gauze; this chimney is surrounded by a chamber containing water, which, by its evaporation, is to prevent the too great heating of the lamp.

The claims made are to the application of heat to close vessels, so that the vapour arising from the liquid contained therein may be condensed and saved; also, "the use of water, or other liquid, or the use of metals, for abstracting, or conducting away, the heat of a safety lamp."

Besides the foregoing, mention is made of plates of metal, to distribute or conduct heat within boilers, or other apparatus, and figures are given of this application, but these are not accompanied by any definite explanations, nor, so far as we understand them, is there any thing new in the idea of applying them; the object, we presume, being merely the increase of the metallic surface by which heat is to be diffused.

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41. For a *Brick Machine;* Daniel Wolfe, Mount Vernon, Knox county, Ohio, December 23.

This machine is intended for the pressing of brick from clay unmixed with water, but merely pulverized, or broken up. The pressure is made by the revolution of a horizontal shaft on the upper part of the machine, a cam upon which forces down a piston, the lower end of which enters the mould, the piston rod having a friction roller on its upper end, to lessen the friction of the cam. The bottom of

the mould is formed of a second piston, or lifter, which is made to rise when the brick is pressed, and presents it for removal at the top of the mould; this lifter then falls, and the mould advances from under the piston, to be filled with the pulverized clay. At each end of the mould there is a piece cut out of its upper edge, in a semicircular form, and as it returns under the piston, the clay is removed by a semicircular projecting piece, fitting into these excavations; the clay then lies in the form of a hollow trough. The design of this is to leave a sufficient quantity at the sides to render the angles solid.

We have not attempted to describe the accessory parts by which the different movements are communicated, not deeming it important so to do. The claim is to "the arrangement and combination of the machinery as described, so as to carry on the several parts of the process usual in making bricks from clay not mixed with water. Also, the improvement of the mould, by adapting the semicircular openings to the ends of the moulds, instead of to the sides, the brick being thereby made of the same strength throughout."

The improvement last spoken of refers, we apprehend, to a mould previously made, but more recently patented, which has hollows at the sides; we should esteem this a mere colorable variation, and not that kind of substantial difference upon which a claim ought to rest. The piston worked by a cam, in the manner described, can scarcely be made to exert that immense power which is necessary to the consolidation of dry clay.

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42. For a *Machine for Cutting Grass and Grain;* Enoch Ambler, Root, Montgomery county, New York, December 23.

If mere measurement is description, this machine is well described, the specification consisting of the dimensions of the respective parts, without any reference to them by letters or otherwise, and, of course, there is no claim made, as what is not described could not well be claimed. The drawing affords but an imperfect representation of the instrument, and, so far as we are able to judge of it from what is shown, it is similar in principle, but inferior in construction, to several other mowing machines which have been patented.

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43. For *Bellows for Furnaces and Forges;* John R. Morrison, Springfield, Jefferson county, Ohio, December 23.

The bellows here described consists of a square box, having a partition, or diaphragm, placed horizontally near its centre, furnished with a suitable valve opening upwards. The top of the box consists of a plank, attached to its edges by means of leather, and capable of rising and falling; the bottom, or lower board, is attached in a similar manner, is furnished with valves, and is worked up and down by a lever. A tube conducts the wind from the upper compartment to the forge, or furnace. The claim is to "the whole bellows, as above described, with the exception of the pipe and valves."

The foregoing claim can scarcely be sustained in all its breadth, as bellows strongly resembling that described have been, and are,

employed. Whatever is new in the arrangement ought to have been pointed out, as the "whole bellows" certainly includes all its individual parts.

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44. For a *Straw Cutter;* Joshua Moore, Roane county, Tennessee, December 23.

The patentee has made short work with his specification, and we think that he should have either said more, or nothing, as he claims nothing new. The whole description is in the following words.

"The box is in the usual form for cutting straw, or hay. The improvement is in having a short knife facing the front of the box, fastened to an upright iron bar, which is attached to a treadle that works between the front feet of the box, and one end of the treadle is fastened to the left leg of the box, with a spring under it to raise it, and the other end extending through the right leg. The box is faced with iron, having in it a groove, in which the knife plays."

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45. For a *Corn Sheller;* Ezekiel W. Coffin, Gilead, Oxford county, Maine, December 23.

"The said machine consists of a frame, or box, square, or nearly so, with a hopper fitting the upper part, where the ears of corn are placed, and fall horizontally on to a transverse cylinder reeded, to be made of iron, or wood, which carries the ears under it in contact with a reversed cylinder; the cob to be separated from the corn by being raised by the cylinder, and thrown over the opposite side, while the corn falls into boxes below."

We have in this, as in the preceding patent, given the whole description, which has the negative merit of being equally brief, and the positive defect, like it, of not fulfilling the requirements of the law, in affording a "full, clear, and exact" description, and distinctly telling what is claimed as new. Judging from the drawing, we are inclined to believe that there is enough of originality in the machine upon which to have founded a claim, although there may not be any thing in it superior to others for the same purpose.

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46. For a *Cheese Curd Cutter;* Isaac Hunter, Jr., Braintree, Worcester county, Massachusetts, December 23.

A box, or trough, is to be made, which may be about eighteen inches long, seven and a half wide, and five and a half deep. The top of it is to open by means of hinges, for the purpose of filling it with curd; its ends are left open, but across one of them flattened wires are to be passed vertically and horizontally, so as to form rectangular meshes of about half an inch each; these wires present their edges towards the inside of the box, and operate as cutters to divide the curd. A piston, or follower, forces the curd forward, being, for this purpose, attached to a rod, notched on its upper side, which extends out behind it. A knife is worked up and down by hand, at the cutting end of the box; the frame to which the knife is fastened, is attached to two levers, one of which extends back on each side of

the box, nearly to its back end, where they are attached to a shaft which crosses from side to side near its upper edge; on the middle of this shaft there is a short arm, extending downwards, and carrying a pall, which takes into the notches on the rod of the follower, the effect of which is to advance it about half an inch, by the rising and falling of the knife, which, by its descent, divides the curd into cubes of about half an inch each.

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47. For a *Machine for Dressing Manilla Hemp, &c.;* Chandler E. Potter, Portsmouth, Rockingham county, New Hampshire, December 23.

The hemp is to be dressed by means of revolving combs, fixed into bars which extend between two circular heads, about twenty inches in diameter, and six feet apart; of these bars, there may be four, which are to be set with hooked teeth about three inches long. These bars are to revolve like the beaters of a thrashing machine. At the back part of the frame there is a fixed comb, between the teeth of which those on the beaters pass, and are thus cleaned of any adhering fibres. The hemp is to be hung over an inclined plank, which, towards its lower edge, is made concave, to conform to the cylindrical motion of the dressing bars. The hand of hemp is to be held by twisting one end of it round an iron pin, fixed for the purpose, letting it out as the dressing proceeds, and reversing it to dress both ends. The claim made is to "the combination and arrangement of the machine, and the adaptation of the cylinder, with its teeth, to the cleaning and dressing manilla hemp, and other substances of a like nature."

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48. For an improvement in the *Stomach Pump, Cupping Instrument, and Breast Pump;* Lemuel B. White, city of New York. First patented July 22d, 1833; surrendered, and reissued upon an amended specification, December 23d, 1834.

We noticed this patent at p. 36, vol. xiii., and observed upon the total inadequacy of the specification, a defect which that before us is intended to remove. It appears, however, that this is not a single instrument, but that the same syringe is to be applied to instruments for three or four different purposes. It is, for example, to be applied to a cup of metal, or glass, for the operation of cupping; to another, when the breast is to be drawn; and to a stomach pump, when that instrument is required. In this last apparatus, two ball valves are to be employed, to operate in the receiving and discharging parts of the instrument. The same apparatus, it is observed, may be used for injections. The claims are of some length, but, we think, embrace the old and the new together; much dependence, however, appears to be placed on the arrangement of the whole, "so as to combine in one instrument a complete cupping apparatus; an instrument for evacuating the female breast; a stomach pump, and injecting apparatus, whereby it is rendered much cheaper, more portable, &c." "and one common syringe is made to serve all the purposes above described."

The whole is contained in one box, but certainly the cup and the stomach pump are not one instrument, although the same syringe may be attached to either.

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49. For a *Machine for Splitting Palm Leaves*; Charles Wadsworth, Barre, Worcester county, Massachusetts, December 23.

"The common way of splitting palm leaves for hats," it is observed, "has been by pressing the leaf upon sharp points, or blades, and drawing the leaf against them, and thus splitting them." "In my machine, the leaf is presented to the knives by means of two rollers, or cylinders. The rollers may be made of wood, iron, or any other suitable material; there are deep grooves cut in each roller; all the grooves are precisely alike, and at a distance from each other equal to the width of the palm leaf after it is split into strips for braiding. The grooves in the upper roller are directly above those in the lower roller. There are as many knives as there are grooves in one of the rollers; each knife is made crotched, and the grooves in the upper and lower rollers receive the upper and lower forks of these crotched knives. Each knife is sharp directly at the crotch, and it is to this point in the knives that the leaf is presented by the rollers. The knives are attached to a bar, which is connected to the frame holding the rollers."

"What I claim as my invention, is the employing rollers in connection with knives for splitting palm leaves, in the manner above specified and described."

A patent was obtained for a machine for splitting palm leaf, on the 17th of last month, and is noticed at p. 398 of the last volume. The cutting, although performed by means of cylinders, is on a different principle from that above described.

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50. For a *Machine for Planing and Matching Boards;* Zadock B. Grover, and David Lampton, Springwater, Livingston county, New York, December 23.

This planing and tonguing and grooving apparatus is not as clearly described as might be desired, although the specification is of sufficient length, and the drawings are well executed; it appears plainly, however, that it is similar in principle to Woodworth's machine, although differing from it in its minor arrangements. What the patentees have invented, they do not tell us, there not being any thing in the nature of a claim.

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51. For a *Planing Machine;* Thomas E. Daniels, Worcester, Worcester county, Massachusetts, December 23.

A vertical shaft is to revolve in a suitable frame, with collars to keep it in its proper position. The frame in which the shaft revolves, slides in vertical cheeks, to admit of its being raised or lowered. Two arms project out at right angles from the shaft, and these have slots in them to receive the cutters by which the board is to be planed.

This is to be secured upon a horizontal carriage, moved forward by a pinion acting upon a rack on its lower side. The general operation of the machine has nothing in it of novelty, and "the moving the cutters to the wood to be planed," constitutes the whole of the claim; that is, the raising or lowering of the slide in which the cutters work, instead of raising and lowering the bed, to adapt the machine to stuff of different thickness.

We could refer to several machines in which the cutters are moved to adapt them to the thickness of the wood; of these, one is mentioned in vol. ix., p. 313, in which "the shaft has a sliding motion in the collars, to adapt it to stuff of different thicknesses," and there is a claim to "The sliding motion of the wheel, by which various thicknesses may be planed."

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52. For a *Safety Lock;* Zibeon Wilbur, Woodbury, Litchfield county, Connecticut, December 23.

This lock is described in a very obscure manner, but it is well represented in the drawing. For security, it depends upon the well known principle of combination numbers, or letters; it does not in this, or in its other arrangements, present any thing worthy of particular notice. The patentee informs us in what he considers the principle of his invention to consist, but not in that clear and distinct manner which is to be desired in such cases.

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53. For a *Lathe for Turning Lasts, Boot-trees, &c.;* Henry Mellish, Walpole, Cheshire county, New Hampshire, December 23.

The general principle upon which this lathe operates, is well known to those acquainted with the various kinds of these instruments which have been invented. Lathes for turning ornaments in almost every conceivable form, were in use upwards of a century ago, but were applied more to articles of curiosity than to those of utility. About fifteen years ago, Mr. Thomas Blanchard obtained a patent for turning irregular forms, and applied it principally to the making of lasts; several factories are now in operation, in which this business is carried on. Mr. Blanchard's patent was renewed by Congress the session before the last. We have not taken the trouble to compare the present machine, critically, with that of Mr. Blanchard; their difference from each other, however, is not one of principle, but of particular arrangement only.

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54. For *Propelling Steamboats, and other Vessels;* Isaac Theal, city of New York, December 23.

At p. 15 of the present number we noticed, as we have more than once had occasion to do, a patent for propelling by means of a revolving screw, and we have now before us a thing of precisely the same character. A screw is to be placed longitudinally on each side of the boat; and one of fifty feet in length, we are told, may be about ten feet in diameter, and so in proportion. The patentee calculates

upon having removed the difficulty attending the attainment of very high velocities, and other preinventors of the screw have made similar calculations, but have found that they had missed a figure. Could a river of uniform depth be found, with a bottom of soft mud, into which the threads of the screw might dip, we are inclined to believe that its action would be much aided thereby; but as this is not attainable, we are more than apprehensive that the old-fashioned paddle wheel will maintain a preference over the screw propeller. There is no claim made.

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55. For machinery for *Bending Wheel Tire, and Setting Carriage Springs;* Fowler M. Ray, Cattskill, Greene county, New York, December 24.

We cannot describe this machinery, without the drawing, excepting in a very general way. The patentee, although he has referred to the drawing, has not, in fact, rendered the construction and operation of his machine very clear. The bending and setting are to be effected by means of rollers, and, to regulate the curvature, a piece which bears against the under side of the metal to be bent, may be forced up against it, in any required degree, by means of a rack and lever. The patentee claims "the sole invention and discovery of the machine."

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56. For a *Washing Machine;* Nahum Swett, Readfield, Kennebec county, Maine, December 24.

This machine is, exteriorly, in the form of an inverted key-stone, the bottom being circular. Two boards, fluted across, like common wash-boards, vibrate backward and forward in the box, or trough. They are each fixed by one end to separate shafts, placed at the upper edge of the trough, their lower ends nearly touching its bottom. The shafts have pinions upon them, gearing together, the consequence of which is, that when one of the shafts is worked backward and forward by means of a lever, the boards vibrate in directions opposite to each other.

The claim is to "the general construction of the machine, in which the arms, or washers, are made to move in opposite directions, and to operate on the principle of common fulling mill stocks, by means of two shafts and lever purchase."

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57. For *Steel Carriage Springs;* Lyman Gleason, Stafford, Genessee county, December 24.

A steel bar is to be bent spirally, like the spring of a house bell. The outer end of this spring is to form a strap, by which it is to be attached to the carriage, and its inner end to a pin, by which it is to be connected to the body. There is no claim made, nor are there any letters of reference to the drawing.

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58. For a *Machine for Moulding Bricks;* Robert Ranken, Frankfort, Waldo county, Maine, December 23.

In this machine, the clay is to be mixed in a pug mill, the vertical shaft which carries the knives being turned by a sweep, in the ordinary manner; from this shaft, also, is communicated the various motions necessary to the completion of the process. The clay is to be pushed out from the bottom of the mixing well, into a receiving box directly over the moulds, in which the bricks are to be pressed. A blow is to be struck on the clay, by the dropping of a heavy follower, previous to the final pressing. The claim made is to "the eccentric motion of the cam wheel for vibrating the front frame. The double follower by which a blow is first struck upon the mortar, and heavy pressure afterwards made. The sliding cutter with its appendages, operating in the manner described, and the general arrangement and combination of the respective parts, by which the machine differs in its character from all others previously used for the same purpose."

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59. For a *Clapboard Machine;* Otis and Daniel Parker, Hubbardston, Worcester county, Massachusetts, December 24.

The clapboards are to be cut by means of a circular saw, from timber prepared by quartering at an ordinary saw mill. The machine appears to be well arranged for the purpose in view; the only thing claimed is the manner of presenting the stuff, or timber, to the saw, by means of head blocks of the particular form described. In its general construction, it resembles some other machines for the same purpose.

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60. For a *Horse Power;* William Emmons, city of New York, December 24.

Were all the thrashing, washing, and churning machines, and all the horse powers, which are patented, really new inventions, we should certainly find in them a most apt exemplification of the versatility of human genius; as it is, however, we must seek elsewhere for our illustrations of this topic. Each of them may be divided into two or three classes, under which, with but few exceptions, all the individuals may be arranged. The horse power before us is one of a very numerous class, and is no more than a variety of a well known species.

A vertical shaft is to be turned by a horse attached to a lever, or sweep; upon this vertical shaft there is to be a cog wheel, mashing into a pinion on a second vertical shaft, on the lower end of which there is a bevil wheel taking into a pinion on a horizontal shaft, passing under the feet of the horse, and from which motion is to be communicated, in the usual way, to a thrashing, or other machine.

The patentee gives the precise proportions of the respective parts, and says that what he claims as his "invention and improvement, is the proportions and peculiar arrangement of the several parts of the above described horse power." Now, as regards arrangement, there is nothing peculiar, and as respects proportion, the law declares, "that simply changing the form, or proportions, of any machine, in any degree, shall not be deemed a discovery."

Specifications of American Patents.

Abstract of the Specification of a Patent for a Machine for Moulding Bricks. Granted to William C. Grimes, *of York, in the county of York, in the State of Pennsylvania, December 2nd,* 1834.

This machine is constructed upon the following general principles. A wheel is affixed horizontally to, and revolves with, an upright shaft, the latter being properly supported above and below by a suitable step and box, in which its gudgeons turn. The moulds in which the bricks are to be formed, are placed around and upon the face, or upper side, of the wheel, near its periphery; these may stand in the direction of radii from the centre of the wheel, or otherwise. Two or more moulds may be united or connected together. A hopper, or trough, of sufficient capacity, is placed in an inclined position, with its lower end over one or more of the moulds at a time, as they pass under it. This hopper is to contain the tempered clay of which the bricks are to be made, and through that part of the bottom of it which projects over the mould, or moulds, an opening, or openings, are made of the length and width of a brick, through which the clay is to descend into the moulds. The motion of the wheels is not to be continuous, but intermitting; while it is at rest, a mould is immediately beneath the opening in the bottom of the hopper, or trough, and the clay is then forced by a piston down into it; the piston then rises, and the wheel moves, and the moulds are thus filled in succession. As the filled moulds pass round upon the wheel, they are removed, and replaced by empty ones.

It is manifest that two or more moulds may be filled at the same time, by the use of two or more openings and pistons, and the employment of such other devices as may thereby be rendered necessary, sufficient power being applied for that purpose.

The number of moulds will depend upon the diameter of the wheel, which will admit of considerable variation, but from four to six feet I think the most convenient.

The moulds must be slightly attached to the face of the wheel, which may be done in various ways, the following being among the best. From the under side of the moulds project two dowel pins, which fit into corresponding holes in the face of the wheel, by which means the moulds are kept from any lateral or horizontal movement. The dowel pins should be short, so that the moulds may be readily disengaged from the wheel. The holes for the pins, or dowels, in the face of the wheel, should be pierced through it, so as to prevent them from being filled, or choked with dirt, &c.

Two or more moulds may be united in one frame, as is usual in brick moulds. The frames of the moulds are inclined from each other, like key-stones, so as to stand as radii from the centre of the wheel, thus forming the proper arch or curvature around the wheel, and their upper surfaces should form a true plane. Each frame of moulds has a thin plate, or board, which is equal in length and breadth to its corresponding frame, and forms the bottom or bed of

the moulds. The aforesaid dowel pins pass loosely through holes made for the purpose in this plate; the latter not being otherwise fastened to the moulds, its use will be apparent to any one acquainted with the usual mode of moulding bricks.

The machine may receive its motion by a strap, carried around the fly-wheel, and over a drum, or pulley, which last may be driven by any competent power; or the machine may receive its motion by a crank attached to the fly-wheel shaft, or in any other convenient mode.

I do not mean to confine myself to the particular form or arrangement of the parts as before specified, but to vary them as experience or convenience may dictate, whilst the general principle remains unchanged.

What I claim as new, and as my invention, and for which I ask letters patent, is, 1st. The moulding of brick upon, or in moulds upon, the face of a revolving horizontal wheel, disk, or rim, constructed and acting upon the principle herein specified.

2d. The manner of forcing the clay into the moulds, by the combined action of a feeder and piston.

3d. The general construction and combination of the respective parts of the above described machine, from which general combination it derives that character by which it will be readily distinguished, by any competent machinist, from the various machines for moulding bricks already in use.

And I do hereby declare that I do not intend to claim as my invention, the piston, cranks, hopper, or any other part of the said machine, taken separately and individually, as these may constitute the elements of other machines; but, as aforesaid, the construction and combination of these parts upon the principle by me devised, and herein fully exemplified.

WILLIAM C. GRIMES.

The foregoing comprises about one-half of the specification, the remainder generally referring to the drawings. The same remark will apply to the next patent, and also to those for making nails. The machines manifest much ingenuity, and an account of their performance, when completed, has been promised, which, if satisfactory, will appear in the Journal.—[*Editor.*

Abstract of the Specification of a Patent for a Machine for Pressing Bricks. Granted to WILLIAM C. GRIMES, *of York, York county, Pennsylvania, December 2nd,* 1834.

The general principle of the construction and operation of this machine, is briefly as follows.

Upon a vertical shaft, or spindle, is fixed a wheel, disk, or rim, of sufficient size, which is to revolve horizontally. In the upper face of this wheel are a number of holes, or mortises, which are the moulds in which the bricks are to be pressed. The bottoms of these

moulds are not a fixed portion of the moulding wheel, but are the upper faces of movable pistons, that slide up and down in the moulds, as the wheel revolves. The rods, or posts, which support and guide the pistons, descending vertically from them. The lower ends of the piston rods, or posts, slide round as the wheel revolves, upon a circular horizontal platform, or rim, or rather upon two platforms, one-half of the circle, or thereabouts, being elevated above the other about two or three inches. When the pistons rest upon this elevated portion of the circular rim, or platform, their upper faces are flush with, or above, the upper surface of the wheel; hence the bricks which have been pressed, being thus raised, can be removed with facility; while upon the opposite side of the wheel, the pistons upon the lower portion of the rim, have their upper surfaces sunk down within the moulds, leaving cavities into which the bricks are dropped, as the pistons are depressed, the motion of the wheel, which is intermitting, not being too rapid for that purpose.

Just before the pistons rise on to the elevated portion of the circular rim, they pass under the short end of a strong iron lever, which projects over the face of the horizontal moulding wheel, far enough to cover the moulds as they pass under it. The lever receives a continuous motion from a crank and shackle bar, the latter being jointed to the opposite, or long end, of the lever. The crank is regulated and assisted by a heavy fly-wheel, in passing that point in which there is the greatest resistance to its motion.

While a brick is being pressed by the short end of the lever, the moulding wheel is at rest, as it receives its motion by a pall, or movable hand, that has a vibratory or reciprocating motion, which it receives from a crank fixed for that purpose, on to the end of the fly-wheel shaft.

The horizontal moulding wheel may be of iron, and cast in one entire piece, of such thickness as may be necessary to its strength, the requisite depth of the moulds being formed by a flanch, rim, or projection, standing out upon the face of the wheel, the said rim, or flanch, making the sides and ends of the moulds. The moulds being in a circle, are placed as near to the periphery of the wheel as a proper thickness of metal will allow; the inner ends of the moulds may approach very near to each other, leaving only sufficient strength of metal between them; hence it may be seen that the number of moulds in the face of the wheel will depend entirely upon its diameter, which may be very much varied, but from three to six feet I think the most suitable.

The moulding wheel, pistons, horizontal rim, and fly wheel, should consist of cast iron, and, in fact, the whole machine should be made of metal.

Motion may be given to the machine by a strap, carried round the fly-wheel, or by the crank attached to the end of the fly-wheel shaft, which may project beyond its bearing for that purpose.

I do not mean to confine myself to the particular form and arrangement of the parts as before specified, but to vary them as experience or convenience may dictate, whilst the general principle remains unchanged.

What I claim as new, and as my invention, in the above described machine for pressing brick, and for which I ask letters patent, is—

1st. The revolving horizontal wheel of moulds, constructed in the manner, or upon the principle, herein described, in which the processes of putting in, pressing, and removing the bricks from the moulds, are all done at one and the same time.

2d. I also claim the revolving pistons, as connected with the revolving moulds, and operating in the manner, or upon the principle, set forth in the foregoing specification.

3d. I also claim the employment of the stationary rim with a double platform, for raising and depressing the pistons, as before described.

4th. I also claim the scolloped rim, or flanch, for the purposes hereinbefore set forth.

5th. I also claim the pressing of brick by means of a lever, operating, and operated upon, as herein shown.

6th. I also claim the general construction and combination of the respective parts of the above described machine, from which general combination it derives that character by which any competent machinist will readily distinguish it from any of the brick pressing machines previously in use. But I do not claim the pistons, fly-wheel, shafts, or any other part, taken individually, as these may constitute the elements of other machines; but, as aforesaid, the construction and combination of these parts upon the principle by me devised, and herein fully exemplified.

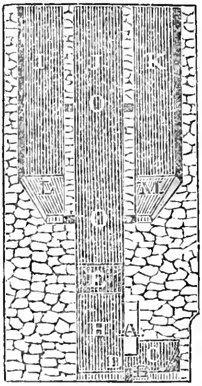
WILLIAM C. GRIMES.

Abstract of a Specification of a Patent for a Furnace for Preparing and Smelting Iron Ore, with Anthracite Coal. Granted to THOMAS S. RIDGWAY, *Pottsville, Schuylkill county, Pennsylvania, December 17th,* 1834.

The hearth of the smelting furnace, or stack, as seen in the section, letter J, may be in the usual form of smelting furnaces, and receive the blast at one or more openings in the bellows wall, made for the purpose, excepting the wind wall, opposite the blast, marked letter H, which is at an angle of forty-five degrees, or thereabout, and extending up the said wall of the stack to the bottom of a door, or opening, letter E, made for the purpose of rendering the fire manageable; this door will be placed in the stack at the top of the smelting fire, which will be from four to six feet high above the hearth, that being about the maximum height that a blast can be forced through anthracite coal; whereas the usual height to which it is forced in a charcoal furnace is thirty-five feet.

Another stack, marked I, in the section, to be charged or loaded with anthracite coal, and kept hot by caloric received from the smelting stack by means of one or more openings in the wall of the smelting stack, opposite O, marked in the draft, at a convenient height

above the smelting fire, or by means of a separate fire, as the case may be; the intention of this operation is to dissipate sulphur from the coal, and to keep it in a proper state of heat for the smelting fire, without useless consumption of fuel. At the bottom of this stack is a door for the purpose of taking out the coal, after it is prepared to put on the smelting fire.



The purifying and carbonating stack, oven, or chest, marked K in the draft, may be attached to the smelting furnace, or be apart from it, and receive caloric, or heat, from the smelting furnace, by one or more apertures in the wall of the smelting stack, opposite the letter O in the draft, or by a separate fire. This stack is to be loaded or charged with iron ore and anthracite coal, or charcoal, or iron ore and charcoal, together with the proper fluxing materials, as may best prepare the ore before it is put on the smelting fire. There is a door in the bottom of this stack, for the purpose of taking out the ore after purification. This indispensable operation of carbonating the ore, cannot be performed without heat, in the absence of oxygen, nor can it be performed in the usual way, owing to the great specific gravity and slow combustion of anthracite coal; whereas, in this way, only a very small quantity of charcoal will be required to purify and carbonate a ton of ore.

What I claim as my own invention is the carbonating stack, oven, or chest, and also the stack for preparing the anthracite coal, and relieving the smelting fire of the great burthen of ore and anthracite coal requisite in the usual way of smelting; also, the inclined wind wall, which renders the smelting fire so manageable that it may be stirred as often as required; and, lastly, the combination of the above three stacks. These may be built of stone, or any good, durable material, and of any convenient size or capacity, suitable to the power of the blast, with valves at the tunnel heads, or top, to regulate and direct the heat from one stack to another.

Thomas S. Ridgway.

Specification of a Patent for a Machine for Hulling and Breaking Cotton Seed, preparatory to the expressing of oil. Granted to Charles Beck, *and* William Jenks, *Columbia, South Carolina, December 17th,* 1834.

We make a cylinder of wood, either solid or in sections, which is to be perfectly round, and to run on gudgeons in suitable boxes; this cylinder we cover with sheet iron, or sheet steel, punched from the inside, so as to form the surface into a rubber, or grater. The punch by which the teeth are formed is so shaped, that, in raising them, they are straight, or square, on one side, and rounding on the other,

the straight side being that which meets the seed in the turning of the cylinder. These teeth are in spiral rows, placed at an angle of twenty-five or thirty degrees with the cylinder, and about three-fourths of an inch apart.

We also prepare a concave bed of a curvature adapted to the cylinder, which we cover with teeth in the same way, but placing the rows of teeth at a different angle. This concave may be borne up to its place by springs, so that it may recede, should any hard substance pass in with the seed. Its ordinary station, however, is such that its teeth come nearly, but not quite, into contact with those on the cylinder. The hull will be removed from the seed by passing it through this machine, and the seed will also be broken into small pieces, when the two may be separated by a sifter, which may either be attached to the machine, or used subsequently. A machine thus constructed will hull the seed as rapidly as three gins will deliver it, and that in the most effectual manner.

We are aware that machines very similar to that which we have described, have been used for hulling clover and other seeds, and for rubbing and smutting wheat, and other grain; but we have adapted it more perfectly to the hulling and breaking cotton seed, by the form which we have given to the teeth, which adaptation will be clearly understood by an examination of the drawing deposited in the Patent Office; and it is this adaptation which we particularly claim as our invention.

CHARLES BECK,
WILLIAM JENKS.

Abstract of the Specification of a Patent for a mode or machine for making Wrought Nails, Tacks, or Spikes. Granted to WILLIAM C. GRIMES, *York, York county, Pennsylvania, December 17th,* 1834.

To make wrought nails by machinery, is an object that has been sought by numerous individuals; hence it may be useful, in order to point out more clearly the novelty in the present plan, to refer to the general principles upon which preceding machines, or processes, for that purpose have been founded.

One of the first, and, it is believed, an almost universal principle, that has been observed in previous attempts to make wrought nails, has been to make them from rods that were rolled or slit to the size of the larger part of the body of the nail. To taper, or to give to the nail its requisite form, from such rods, various modes have been essayed; swaging, forging, and rolling, have been tried, but the latter by far the most generally. Modifications of these principles, to effect the object proposed, have been too numerous to be here detailed. But, whatever has been the modification of the machine, it has generally embraced, or been constructed to operate upon, only one of these principles. The novelty of the present machine consists in its being constructed so as to combine several of these principles at the

same time, viz.: cutting, swaging, or pressing, and forging, or percussion, and to make the novelty more apparent, the nails, &c. are not to be made from rods of the size of the body of the nail, but from broad plates, and these at a red heat. These plates are to be prepared by rolling, after the manner of plates for cut nails, but with this difference,—they must be of perfectly sound iron, and two or three times as broad as the length of the intended nail, but of about the same thickness. These plates are to be cut off transversely into pieces, about two-thirds the length of two nails. From the sides of these pieces, or plates, the nails are to be formed and cut, the length of the nail running with the grain of the iron, or parallel with the length of the original plate. These plates are held, turned over, and the nails cut from the sides or ends of them, in the same manner as is practised in making cut nails, but with this difference,—in making cut nails, the plate is either cold, or at what is called a black heat, whilst in my process the plates are to be at a high red heat. In making cut nails, they are cut off with a regular taper from end to end; in this process, they are tapered not more than half their length. In making cut nails, the width of the plate is the length of the nail; in this process, the plate is cut into lengths transversely, which length forms two nails, by their points overlapping each other. In making cut nails, the first action upon the nail is to sever it from the plate; in this process, the nail is nearly formed before it is severed from the plate.

As the plates are cut at a high red heat, they would soon destroy the temper of the steel cutters, or dies, if continually applied, as in making cut nails; therefore, to prevent such injury, I cut a few nails in rapid succession, and then allow a short intermission, when the plate is withdrawn, and a jet of water is applied for an instant to the dies, which continue in motion, the plate and the jet of water being applied alternately to the dies.

Two or more of these plates should be in the fire at a time, as only a part of one plate can be cut or formed into nails without reheating. The plates may be changed in the furnace during the time that the jet of water is let on to the dies.

The water in the pipe that conducts it to the dies, should be under considerable head, or pressure, and the starting and stopping the jet may be done in various ways; the valves, or cocks, may be opened at regular intervals by the machinery, or a treadle may be applied for that purpose.

When the nail is to be formed and cut from the plate, such a portion of the latter as shall be necessary, is placed between the jaws, or dies, constructed for the purpose, and which are parallel with the end, or edge, of the plate, for about half or two-thirds of the length of the nail. The remainder of the dies are turned off at a slight angle, running out to the edge of the plate, thus forming the taper, or point, of the nail; the plate is then turned over, and its opposite side brought into the same position between the jaws, and another nail is cut, the point of which commences at the same point in the plate that the taper began in the preceding nail.

A heavy hammer, for striking a head upon the nail, is placed in front of the end of the jaws; this hammer is fixed upon the end of an upright rod, or helve, the lower end of which is fixed to a horizontal shaft, furnished with round tenons, or gudgeons, that work in suitable boxes on each side of the frame of the machine. From the side of this shaft an arm projects, being inclined downwards; this arm may be about one-third of the length of the said helve. A beam, or lever, whose fulcrum is near its centre, lies nearly in a horizontal position, with one end beneath the fly-wheel, and the other above the said short arm, to which it is jointed by a link. A cam on the periphery of the fly-wheel acts upon the end of this lever, or beam, the latter being gradually borne down by it, while the opposite end of the beam rises, and, by its aforesaid connection with the hammer, the latter is thrown back to a proper distance; the said cam then terminates abruptly, and, by a strong spring, the hammer is brought forcibly upon the iron which is to form the head of the nail.

I intend sometimes to form the head upon the nail by pressure, instead of percussion.

Any competent power may be employed to impel the machine.

Machines greatly differing in form, and in the particular arrangement of the respective parts, may be constructed upon the preceding principle, to produce similar results, or effect the same end by similar means. I, therefore, do not intend to limit myself to the particular arrangement herein specified, but to change such form and arrangement as I may think proper, while the principle remains unchanged.

What I claim as new, and as my invention, and for which I ask letters patent, is, 1st. The making or forming wrought nails, tacks, or spikes, from, or upon, the edges, or sides, of metallic plates, by pressure and cutting, after the manner, or upon the principle, herein specified.

2d. The manner of severing the plate from the nail, so that a part of the latter is left standing out beyond the end of the jaws, as herein before described.

3d. The side jaw by which the plate is gauged, and the nail compressed, and removed from the jaws.

4th. I also claim the general construction and combination of the respective parts of the above described machine, by which general combination it derives that character by which any competent machinist will readily distinguish it from any of the various nail machines heretofore in use.

But I do not claim as my invention, the fly-wheel, cams, levers, or any other part of the machine, taken separately and individually; but, as aforesaid, the combination of these parts upon the principle herein fully set forth. Nor do I claim the forming of nails from nail plates, by cutting them with the grain, that having been already done; but in this particular I confine myself to the peculiar manner in which the cutting is effected.*

WILLIAM C. GRIMES.

* See note p. 38.—*Editor.*

Abstract of the Specification of a Patent for a mode of manufacturing Wrought Nails, Tacks, or Spikes, by first preparing the material, rod, or pieces, from which they are to be made, in such a manner as greatly to facilitate the process of making them, and then operating upon the pieces so prepared by means of a machine particularly adapted to that purpose. Granted to William C. Grimes, *York, York county, Pennsylvania, December 17th,* 1834.

The metal is first to be rolled or slit into rods, but not of the exact size and form of the body of the nail to be made, but they are to be broader one way, and thinner the other, the rods being usually about twice as broad as they are thick; the width and thickness of the rod, or piece, however, being such that, when it is staved, swaged, or compressed upon its sides, or edges, enough to bring it into a square form, it shall then be of the requisite thickness for the body of the nail, tack, or spike. The rod is to be cut off into the proper lengths for the nails, tacks, or spikes; they are to be cut square off at one end, the other being cut very obliquely across the rod, thus giving the requisite taper for forming the point to the nail, &c., which taper will be greater, or less, according to the obliquity of the cut across the rod. The nails, tacks, or spikes, so prepared, may be finished by various methods, as by forging, swaging, or compression; and the machinery to operate upon either of these principles, to effect the same end, is susceptible of an almost endless variety of modifications.

The machines that I have adopted for the purpose, are made to operate upon the principles of swaging and compression, and are constructed as follows. The prepared piece is let or dropped into the upper end of an angular trough, or gutter, which stands inclined from a vertical line about thirty degrees, (more or less.) The trough consists of two flat sides, joined at right angles, the angular point being downwards, so that, if the trough was placed in a horizontal position, its sides would rise at an angle of forty-five degrees from the horizon; the piece that forms this trough, or gutter, is the ridge, or rather one corner, of a triangular frame. Swages, or hammers, strike or act upon different sides of the nail, as it descends along this trough, or gutter; these swages are placed in pairs, each pair striking upon the nail within the trough alternately, and consequently upon its different sides; their helves, at their outward ends, are jointed to the two lower angles of the frame, and in such position that they operate at right angles with each other.

The piece for the nail, &c., when dropped into the gutter, slides down to a movable piece, or stop, that rises through the bottom of the trough, which arrests it for a moment, or until both swages have operated, when this stop recedes, and the piece instantly slides down until it is arrested by a similar stop, and is again struck by two other swages, and so on through any required number; three pair will, I apprehend, be sufficient in all cases. The last pair of swages, which

are at the lower end of the trough, or gutter, fall upon, and gripe the nail, while a heavy hammer, from below, strikes upon and heads the same. The heading hammer, swages, and stops, all receive their motion from cams fixed upon a revolving shaft, running up through the triangular frame. Two or more nails may be passing down the angular trough at the same time, as the stops, after allowing a nail to pass, immediately resume their position. The swages, hammer, &c., after being raised by the cams, are forced back upon the nail by suitable springs.

I intend sometimes to form or finish the nails by pressure, which is effected in the following, or in a similar, manner. The machine, when intended to finish the nail by pressure, is to be made, generally, like the preceding machine, but the triangular frame will be much shorter, as there will be the lower pair of swages only, the inclined trough, or gutter, having a single stop. The action upon the nail, &c. is to be very similar to that before described, being alternate, and upon different sides, but it is to remain in the same place till finished. After a few reciprocating or alternating motions of the jaws, one or both of them close or press upon the nail, and hold it whilst there is a head pressed upon it. In forming some nails, the alternating motion of the jaws may be unnecessary, as they may close upon the nail at once, and form it sufficiently by this single pressure.

There should be two pairs of shears for cutting off the rod, whether it is cut hot or cold; the cutting edges of these stand at right angles, or nearly so, but both pairs may be fixed upon short arms, standing out from a strong vibrating, or semi-revolving, shaft; one pair to cut the rod off obliquely, and the other pair to cut it square. The two troughs, spouts, or gutters, into which the nails fall from the respective shears, may both lead to the same point, and terminate in one groove, or gutter, before it reaches the machine below.

I intend sometimes to cut the pieces for the nail from plates, instead of from rods. The plate should be of sound material, and rolled much broader than other nail plates. These plates are to be cut off transversely into pieces about two-thirds the length of two nails; from the sides or edges of these plates, the pieces for the nails are to be cut. The plate is to be held and turned over at each cut, in the manner followed in making cut nails, the length of the nail, however, being only about two-thirds of the width of the plate; the shears being bent into such form as to run off to the edge of the plate; the piece thus cut off is brought to an acute point, being tapered less than half its length; the taper, or points, of the nails overlapping each other in the plate. This plate should be at a red heat when the nails are cut from it, if they are to pass directly into the machine; or they may be cut off cold, and afterwards heated and fed to the machine, as before specified.

What I claim as new, and as my invention, in the before described mode of preparing the pieces, or material, for wrought nails, and in the machine for finishing them, and for which I ask letters patent, is,

1st. The cutting the rod obliquely, in the way described, to form in part, or wholly, the taper of the nail, tack, or spike, whereby mere pressure, or swaging, will suffice to finish the nail, &c.; the rods being broader one way, and thinner the other, than the body of the intended nail.

2d. I claim the manner of preparing the pieces for wrought nails, tacks, &c., to be finished in my machine, by cutting them out of plates of metal, as herein before shown. I do not claim the cutting with the grain of the metal generally, that having been previously done, but confine myself to the cutting into the form, and for the purpose, described. I claim the forming or finishing nails, tacks, or spikes, or other metallic articles, by swaging in, or as they descend an inclined trough, or gutter, after the manner, or upon the principle, herein before specified.

3d. I claim the finishing of nails, or similar articles, after being prepared as herein before shown, by alternate or simultaneous pressure, after the manner, or upon the principle, before specified.

William C. Grimes.

Decision in the District Court of the United States, for the Eastern District of Pennsylvania, in a case for repeal of Letters Patent.

Jesse Delano, Jr. vs. John Scott.

May term, 1834. } Scire Facias, to repeal letters patent.

This was an action of general interest, and one of some novelty in our courts; it was a proceeding by scire facias, under the tenth section of the patent law of 1793, brought to repeal the letters patent of John Scott, the defendant, bearing date the 12th day of November, 1830, which were for certain alleged improvements in fire proof chests, called the improved fire proof chests. The plaintiff alleged that the patent was taken out by the said John Scott surreptitiously, and upon false suggestion, and contained no improvement which had not been long known and used by Mr. Delano, and others. The cause came on for trial before his honour, Judge Hopkinson, and a special jury, on Wednesday, the 27th of May, and occupied the court, with the exception of one day, till the 3d inst.

It was proved, on the part of the plaintiff, that Jesse Delano, as early as the year 1828, had made and sold fire proof iron chests, embracing all the material principles and improvements enumerated in the patent of the said Scott. And it also appeared from letters patent, taken out by Jesse Delano, the 7th of March, 1826, for certain improvements, made by said Delano, in fire proof wrought iron chests, and in the locks and fixtures thereof, that said Scott had incorporated into his patent the main principles and features of said Delano's patent.

It also appeared in evidence, that, in 1827, Scott went to work as

a blacksmith in the factory of Mr. Delano, and continued with him about two years, and was employed by him, during that time, in making most of the iron work, and many of the very articles, for the chests then manufactured by Mr. Delano, under his patent, which the defendant patented after leaving his employment.

Scott left Mr. Delano in the fall of 1829, as he said, to go on to a farm in Ohio, but went to Montreal, and attempted the manufacture of fire proof chests there. He returned to New York in June, 1830, visited the factory of Mr. Delano, and proposed to a witness who had worked with him at Mr. Delano's, that they should procure one of his chests, take it apart, and use it for a pattern. Shortly after this, Mr. Scott came to Philadelphia, and commenced manufacturing fire proof chests, and in October of the same year, assured a gentleman who called upon him, that his (Scott's) chests were made in the same manner, precisely, as Mr. Delano's; that he had worked for Mr. Delano for about two years; had learnt the business while with him; that the materials he used were the same as those used by Mr. Delano to make his chests fire proof, &c.

On the part of the defendant, Mr. Scott, it was at first attempted to be shown, that the improvements enumerated in his patent were his own, and not the same with those enumerated in Mr. Delano's patent. But after the evidence was gone through, this ground seemed to be pretty much abandoned, and the counsel rested their defence mainly upon the alleged ignorance of Mr. Scott that he had included in his patent, improvements well known, and long used, by Mr. Delano, and which were enumerated in his patent of 1826.

The cause was delivered to the Jury by Judge Hopkinson, in a lucid and able charge, in which, after stating the principles of the patent law in general, and the different objects intended to be accomplished by the sixth and tenth sections, he explained particularly the nature and effect of the proceedings by scire facias, and entered into an examination of the patent of said Scott, and the testimony offered in the cause; he said the jury were first to inquire if Scott was the true inventor, or discoverer, of all he had embraced in his patent; if they believed that he was, there was an end of the case, and their verdict must be for him; but if he had embraced in his patent, and claimed as his, that which had been previously patented, (of which he intimated there was little doubt,) or if he had embraced in his patent, and claimed as his, that which was original, together with that which was well known, then the patent must be declared void, if this were a proceeding under the sixth section of the act of Congress, and a suit brought by Scott for an alleged violation of his patent; but that this was a different proceeding, and he should instruct them agreeably to the law, as stated in his opinion, on granting the scire facias, though he considered the point open for future discussion. He accordingly told them that the plaintiff in this case must go one step further, and not only satisfy the jury that the defendant had embraced in his patent, and claimed as his, that which was not new, and had been in use before, or which had been previously patented, but

that they must be satisfied that the defendant had done this *knowingly* and *intentionally;* if they believed he had done it through ignorance and mistake, their verdict must be in his favour. The learned judge then applied the evidence to this branch of the case, and commenced on the testimony that had been relied upon as tending to prove that the defendant knew he was including improvements embraced in Mr. Delano's patent of 1826, and said that if the jury should be of opinion that the defendant had claimed in all, or either, of the specifications of his patent, that which he knew was not his invention, but the invention of some other person, and which he knew had been known and used by others before, and had intentionally included it in his patent, then they must find for the plaintiff, and Scott's patent must be declared void.

The jury, after retiring to their room, returned a verdict for the plaintiff, thereby declaring the patent of said Scott void.

Perkins for plaintiff, Earl and Dallas for defendant.

Translations from Foreign Journals.

On various Modes of Imitating Bronze, translated from the Dictionnaire de l'industrie Manufacturiere Commerciale et Agricole; article, Bronzage. By M. H. Gaultier de Claubry.

[Translated for this Journal, by Wm. W. Smith.*]

A bronze colour, varying according to the nature of the substances used to produce it, and approaching more or less to the natural tint, is given to many articles of plaster, wood, paper, or pasteboard. A very brilliant bronze is produced by gold leaf rubbed on a muller, with honey or gum; goldbeaters' clippings are used for this purpose. *Aurum musivum* may be employed for the same purpose; one part of this, and six of calcined bones, must be finely pulverized; a small quantity is taken on a moistened rag, rubbed over the article to be bronzed, which is then scoured with a dry piece of linen, and submitted to the burnisher.

When aurum musivum is to be fixed on paper, it is powdered without the calcined bones, and mixed with the white of eggs, or a light varnish of alcohol; this mixture is applied with the brush, and the article is afterwards burnished.

When a plate of iron is immersed in a diluted and boiling solution of sulphate of copper, the copper is precipitated in the state of a powder, which can be easily washed by agitating it with water. This powder, mixed with six times its weight of calcined bones, also in fine powder, may be substituted for the preceding mixtures.

It is sometimes desirable to give articles a grey colour, nearly resembling that of iron; this is called white bronze; it is produced by several methods; Argentum musivum gives a very pretty tint; tin reduced to an extremely fine powder, (by pouring it, while fused, into a box, the interior of which is well covered with pulverized chalk, and shaking until perfectly cold,) is also used. This powder,

* At the request of the Committee on Publications.

sifted and mixed with a solution of glue, is applied to the article, which takes a dull colour; if brilliancy is required, the burnisher must be employed.

Argentum musivum is an amalgam of equal parts of bismuth, tin, and mercury.

When plaster is to receive the white bronze, it is rubbed with plumbago.

Well cleansed cast iron, dipped into a weak solution of sulphate of copper, becomes coated with copper, which adheres to its surface; under these circumstances, the copper assumes a reddish hue, which passes to yellowish brown.

Bronze, exposed for some time to the action of the atmosphere, is covered with a very thin coating of carbonate, which gives it a green hue, known by the name of "patine antique." Imitations of this tint have been attempted in various ways; but, however great may be the resemblance of these artificial colours to those produced by time, there are still certain characteristic shades, which a practised eye can easily detect; the antiquary should not, therefore, complain, since it is always possible for him to distinguish an "antique" from an imitation.

The hue of antique bronze is given to bronzed articles intended for house ornaments, or to medals, by treating their surfaces with different compounds. A great number of these mixtures have been recommended; many of them answer sufficiently well; but the beauty of the product depends very much on the manner of applying them, for different workmen, using the same composition, obtain very different tints.

We will here merely enumerate some mixtures with which our best workmen produce handsome colours.

The metal having been well scoured with nitric acid, the compound is very uniformly spread over its surface, with a proper linen roll, or brush.

The bronze colour obtained, whatever may have been the mixture employed to produce it, will depend on the nature of the alloy; since the alloys used for casting the ornamental articles which are to be bronzed, vary, it follows, of course, that the same bronzing mixture, applied in the same manner, cannot, in all cases, produce the same tint.

Nitric acid, diluted with two or three parts of water, is rubbed over the metal; the colour is at first greyish, but soon becomes greenish blue.

A solution of one part sal ammoniac, three carbonate potash, six of common salt, and eight nitrate of copper, in twelve parts of boiling water, is rubbed at intervals on the metallic surface; the tint is unequal and harsh, but it softens, and becomes more uniform.

A beautiful greenish blue bronze may be obtained by washing a copper surface, with concentrated aqua ammoniæ, for a sufficient length of time.

The base of nearly all the compounds employed, is vinegar and

sal ammoniac. Thus, skilful workmen use nothing but a mixture of sixty grammes* sal ammoniac, and a litre† of vinegar.

Another mixture, which gives good results, is composed of thirty grammes sal ammoniac, eight grammes salt of sorrel, and ten litres of vinegar.

An experienced chaser of Paris uses a mixture of 15 grammes sal ammoniac, 15 grammes common salt, 30 grammes spirit of hartshorn, 1 litre vinegar.

One litre vinegar, 15 grammes sal ammoniac, 15 grammes common salt, and 15 ammonia, form a good mixture. A soft brush is dipped in the mixture, and the article is rubbed with it until it takes a handsome bronze tint; the piece should be barely moistened, and any excess of liquid should be removed by another brush. If, after two or three days, the tint is found to be too pale, the process is repeated. The work may go on in the air, the colour takes better; the copper need not be heated.

The two following compounds produce a handsome effect:

Eight grammes sal ammoniac, eight grammes common salt, sixteen grammes ammonia, one-half litre of vinegar.

Two grammes salt of sorrel, eight grammes sal ammoniac, one-fourth litre of vinegar.

The mixture is applied with a brush which is almost dry, and the operation is continued until the desired tint is obtained. These compounds produce a better colour when the process is conducted in the sun.

Medals are coloured in a different manner; they are immersed in a liquid, the composition of which varies much.

Five hundred grammes of powdered sub-acetate of copper, are thoroughly mixed with 333 grammes sal ammoniac, also in powder; make a paste of this, with one part of a glass of vinegar. Take a piece of paste, of the size of a walnut; mix it with the remainder of the vinegar, and a litre of water; boil it for a quarter of an hour; allow the solution to repose, and decant the clear liquid. To bronze medals, pour some of this boiling liquid over them, continue the ebullition for five or six minutes, decant the solution, and wash the medals perfectly clean. The same liquid cannot be used more than five or six times; at each time, a quarter of a glass of vinegar must be added. The process must be carried on in a copper pan; the medals are to be fixed on small blocks of wood, so that they cannot come into contact with the pan, or with each other.

The medals should be well wiped immediately, that the tint may not change; then dried with care, and subjected to the burnisher, to render them bright.

It almost always happens that some of the pieces take a bad tint; very often some are spotted.

A mixture of 510 verdigris, 250 sal ammoniac, rubbed with vinegar on a marble slab, and transferred to well closed vessels, is used

* A gramme is equal to 15.4 grains.

† A litre equals 1.76 imperial pints.

in the same way; a piece is added to a glass of vinegar, and two litres of water, and the whole boiled for ten or twelve minutes.

A good bronzing mixture for alloys of lead and tin, consists of 100 parts of nitrate of copper, perfectly pure and neutral, in a solution at 18° of Baume's hydrometer, and 20 parts sal ammoniac; this liquid must be applied so as to wet the metal as little as possible.

We will here detail the Chinese process of bronzing, as it is a curious one:

The copper is washed with vinegar and ashes, until it becomes perfectly bright; it is dried in the sun: 2 parts verdigris, 2 cinnabar, 5 sal ammoniac, 2 duck's bills and livers, and 5 alum, are to be finely pulverized, and well mixed; a liquid paste is made with this mixture; the copper is covered with the paste; it is then heated, allowed to cool, and the paste removed; this is repeated eight or ten times. The copper assumes a pretty tint, which is so durable that the action of the air and rain does not impair its beauty. A mixture of 1 part sal ammoniac, 3 cream of tartar, 3 common salt, 12 hot water, and 8 of a solution of nitrate of copper, gives a good bronze. By increasing the quantity of common salt, the colour becomes clearer, and approaches to yellow; by diminishing the proportion of the same, or omitting it altogether, different shades of blue may be produced. The action is increased by adding a greater proportion of sal ammoniac.

Certain articles are bronzed red by coating them with oxide of iron, and exposing the pieces to heat; the same tint may be given by rubbing them with a liquid containing $\frac{1}{30}$ sulphuret of potassium; the colour readily changes to greenish brown.

Gun barrels are bronzed by being rubbed with fused chloride of antimony; this must be repeated several times; to obtain a successful result, the barrels must be gently heated.

MM. d'Arcet and Thenard proposed a cupreous soap, with which, when plaster is impregnated, it assumes so much the tint of ancient bronze as to deceive the eye, and its real character can only be ascertained by touching it.

Pure linseed oil is converted into a neutral soap by caustic soda; to this a strong solution of common salt is added, and the whole is boiled until the liquid has a great specific gravity, and the soap swims at the surface in small grains; the solid matter is to be drained and pressed, to rid it as much as possible of the fluid; dissolve this soap in distilled water, and pass the solution through linen; dissolve also in distilled water, 80 parts sulphate of copper, and 20 parts sulphate of iron; filter, and into the latter solution pour the solution of soap, until decomposition is complete. A little sulphate is now added, and the whole stirred several times at intervals, and then boiled; in this way, the soap is mixed with an excess of sulphate. It is washed first with a large quantity of boiling water, next with cold water, and thrown on a linen, pressed, and dried as much as possible.

Boil a kilogramme* of pure linseed oil, with 250 grammes of pure

* 2.2 avoirdupois pounds.

and finely powdered litharge; strain through a linen, and allow the oil to stand in a stove; it clarifies much better there.

Fuse together in a delft-ware vessel, on a steam or water bath, 300 grammes of boiled linseed oil, 160 soap of copper and iron, 100 pure white wax, and keep the mixture melted some time, to deprive it of moisture. Heat the plaster in a stove to 80° or 90° Centigrade, and apply the fused preparation; when the plaster has become so cold that the mixture will no longer penetrate it, it is again placed in the stove, and heated to 80° or 90° Cent.; more of the mixture is applied, and this operation is repeated until the plaster has absorbed enough; it is then again placed in the stove, to deprive its surface of colour; the porosity of the plaster is such that the mixture penetrates it without leaving the finest lines soft, and this result is obtained by no other method; the depth to which the preparation sinks, is greater or less, according as the piece has been placed a greater or less number of times into the stove.

When the article has absorbed a sufficient quantity of the soap, and has taken the required tint, its surface is gently rubbed with a bunch of cotton, to give it the necessary brilliancy; and if it is desired to imitate natural bronze exactly, a small quantity of shell gold is applied to the raised parts. It sometimes happens that flaws, and other defects, render it necessary to insert a piece in statues; the tint of these pieces never exactly resembles that of the surrounding bronze; this effect is perfectly imitated by cutting out a piece of plaster, and running some other plaster into the cavity; the tint of the replaced part differs from that of the mass, and resembles exactly the defect in real bronze.

This process affords the means of obtaining articles of plaster resembling very closely those of real bronze; medals, busts, and even statues, may be finished in this way, provided a stove of suitable dimensions can be procured; the process presents some difficulties, and to these many have yielded; we will mention them for the sake of those about to engage in this art, to show them the faults of others, and furnish them with the means of surpassing their predecessors. It should first be stated, that, with proper care, this process affords most satisfactory results. M. d'Arcet himself prepared some articles, which were taken for bronzes of superior beauty, by skilful artists; the same success may attend operations on a larger scale.

When the plaster is moistened unequally, it does not absorb the soap uniformly, because the porosity of the parts is not equal; the consequence is, that the surface takes various tints; when the pieces are small, this defect need not be feared; but when they are busts, or castings, of large size, it frequently happens that contiguous parts take very different shades of colour, and spots will sometimes be perceived very slightly, if at all, altered by the process.

The occurrence of these blemishes may be avoided by carefully casting the pieces to be bronzed, expressly for this purpose, and ascertaining, by a few trials, what quantity of water must be used, in order that the cast may assume the finest shade; with these pre-

cautions, the process may be conducted successfully, even on a large scale.

The small pieces are dipped into the melted compound, then shaken, and dried on one side, to cause the absorption of the composition remaining on the opposite surface; this may also be accomplished by exposing the surface to a bright fire. A gilder's chafing dish must be used for large articles.

A variety of articles, such as time-pieces, vases, &c., may in this way be manufactured, which resemble very much handsome ornamental bronzes, and can be sold at low prices; it is only surprising that this art is not cultivated to a greater extent, as these ornaments might, by a little perseverance, be introduced into general use. Plaster, finished in this manner, may be exposed to air, moisture, or even rain, without being injured.

On the Obstruction of Cast-iron Water Pipes, by the formation of Nodules of Oxide of Iron within them. By M. Payen.

(Translated for this Journal, by Jos. Wharton.*)

A singular effect has been lately observed to take place by use in cast-iron water pipes, in certain cities. The passage of the water becomes gradually obstructed, by the formation of nodules of impure oxide of iron, of a light brown or greenish colour, which adhere to the internal surfaces of the pipes.

This subject being one of the greatest importance in connection with the health of cities, and the agriculture of various districts, required an elaborate investigation, which I undertook, and of the results of which, the following is a succinct account.

All soluble substances that give an alkaline reaction to water, such as potassa, soda, ammonia, and lime, the carbonates of potassa, of soda, and of ammonia, the borate of soda, and the sub-acetate of lead, are capable of preventing the oxidation of iron.

The relative proportions of these substances, and of the water, required to produce the effect, varies with the alkaline agent employed, and is also affected by the presence of certain foreign salts; the alkaline agents being the same, the nature and quantity of these salts determine the proportions.

When the quantity of alkaline matter is insufficient, oxidation ensues; but it is remarkable that all the points of the surface are not, in this case, equally oxidized, so that the nodular form of the concretions must be assumed from the beginning. The preserving force is overcome only in places where the continuity of the surface has been interrupted, even although it be by an almost imperceptible division. Thus, for instance, the lines on fibrous iron, and the points where the parts of the iron are separated by foreign bodies, are oftentimes pointed out by traces of greenish oxide, which gradually fill up, while the rest of the surface preserves, for a long time, its me-

* At the request of the Committee on Publications.

tallic aspect; and hence the advantage of an iron as *mechanically* pure as possible. The points of contact between a connecting pipe, and the sides of a main, or between two pipes, are likewise sufficient to determine the effect.

The following are a few experiments upon these points.

A cylinder of polished iron, immersed in a saturated solution of pure potassa, diluted with 1000 times its volume of water, (the temperature being 59° Fahr.) was preserved untarnished for a long time; but as the carbonic acid of the air gradually weakened the intensity of the alkaline action, signs of oxidation began to exhibit themselves at various points, and became more and more apparent, while the greater part of the surface preserved its lustre after the lapse of a year.

Conical concretions of oxide were gradually formed on the surface of an iron cylinder, when the latter was immersed in water containing 0.02 parts of its volume of a saturated solution of carbonate of soda. The colour of these concretions was a greenish brown, which acquired a yellowish cast at their summits, while the base in contact with the metal retained its original greenish brown colour. The liquid was not protected from the air.

The same saturated solution being used, but diluted with fifty-nine parts of water, and kept for a year, in an open tube, in contact with polished cylinders of iron, greenish concretions were first formed, which slowly passed round the cylinders, and gradually assumed a beautiful yellow tint, whilst the rest of the surface, even of that part which, by the evaporation of the liquid, was uncovered, preserved its metallic state. In the same circumstances, the iron has been completely preserved from oxidation in water containing 0.023 of a saturated solution of carbonate of soda.

In a saturated solution of chloride of sodium,* protected from the air, there appeared, on the surface, and, it is to be particularly observed, *on the points of contact* between several bars of iron, only some protuberances of greenish oxide, the remainder of the surface preserving its metallic lustre after the lapse of a year. In a similar experiment made in contact with the air, the oxidation continued, and assumed the colour of rust, beginning with the parts nearest the surface of the liquid.

A solution saturated with marine salt, and carbonate of soda, preserved iron entirely from oxidation, for the same space of time, notwithstanding the presence of atmospheric air, and a crystallization of a part of each of the two salts.

The same solution, diluted with nine volumes of water, afforded concretions of oxide.

In endeavouring to obtain, in accordance with the above experiment, the exact proportions of water, of chloride of sodium, and of

* (1) In making a saturated solution of chloride of sodium, in water of the Seine, the liquid suffered a contraction equal to 0.03 of its volume, and disengaged 0.015 of the same volume, of gases contained in the water. The temperature was 59 Fahr., and the pressure 30 inches.

carbonate of soda, the most favourable to the formation of local concretions of oxide, I found that a saturated solution of the two last, (the solution being made at the temperature of 59° Fahr.) diluted with seventy-five times its volume of water of the Seine, (see note 3,) and filtered, produced, in less than a minute, an oxidation both on wrought and cast-iron. The effect was first shown by the appearance of points of a pale green; in ten minutes' time, the lines were well defined.*

When, in compliance with a suggestion of M. Becquerel, the power of electric conductibility was increased, by bringing, by means of a wire, a fragment of well calcined charcoal into contact with a polished bar of wrought or cast-iron—the other circumstances being the same as in the preceding experiment—the greenish protuberances were developed still more rapidly, and in much greater number.

In weak alkaline solutions of the same substances, freed from atmospheric air, oxidation does not ensue.

In those containing atmospheric air, oxidation is arrested when the access of the exterior air is prevented.

When the air of the atmosphere has free access, the concretions nearest the surface pass into a higher state of oxidation, while the greenish oxidation continues, at other parts of the surface, on the points at which it began.†

The figure of the concretions is sometimes irregularly rounded, sometimes conical, and, at times, variously ramified into winding bands.

Bars of wrought and cast-iron, polished, which have been, for the last four days, immersed in water, that had previously stood in contact with a portion of white marble, in the form of a well washed powder, already exhibit, near the surface of the liquid, points of a greenish oxidation, and rust in a floculent state.

The following conclusions may be drawn from the preceding facts, and others not mentioned.

1. That all solutions, having a slight alkaline reaction, may, while the *general surface* is preserved, occasion the formation of local concretions of oxide, at *certain points* of the surface of iron immersed in them.‡

* (2) The chloride of sodium, when present by itself, in small proportions, in water, determines, on the surface of polished iron, local oxidations, which remain greenish coloured the longer, and preserve the remainder of the surface the better, accordingly as the iron is farther removed from the surface of the liquid in contact with the air; but these oxidations do not assume the nodular form.

† (3) In all the preceding experiments, made with a view to their practical application, the water used was taken from the river Seine, and filtered after its mixture with the alkaline solution, and the subsidence of the precipitate, (which fell in consequence.) The temperature during the experiments varied from 59 to 62.6, and from 68 to 69.8, Fahrenheit. Several of these experiments, repeated with the use of distilled water, gave the same results, when the proportions of the alkaline substance, of the atmospheric air, &c., were the same.

‡ (4) Wrought and cast-iron, half immersed in a weak ammoniacal solution,

That the general character and rapidity of this process varies with the presence, and according to the proportions, of atmospheric air, and different salts, that may be brought into action, and is further determined by the presence of breaks in the continuity of the surface of the metal immersed, whether these interruptions exist in a single piece, or at the lines of separation between different pieces of iron, or even between the latter and other substances.

3. That acid solutions determine a uniform, and less bulky, oxidation; on copper, both acid and alkaline solutions determine a general oxidation.

Local concretions must then be expected to ensue in wrought or cast-iron pipes, when exposed to a current of water slightly saline, and having a feeble alkaline reaction. In such case, it will be necessary either to abandon the use of this metal, or at least to contrive convenient places of access to the pipes, at short distances from each other. In this case, owing to the minute state of division of the particles, and the granular formation of the concretions, the obstruction may be removed by the application of a gentle friction, or by the assistance of a diluted acid, too weak to injure materially the metallic parts.

Note by the Translator.

The general properties developed in this paper, as belonging to all alkaline solutions, are considered by the author to present a new series of electro-chemical actions to the attention of the scientic chemist.

Remarks in relation to some new Concretions, produced artificially on Iron. By M. Payen.

In a recent paper, the results of which have been verified by MM. Becquerel and Dumas, I made known a method of forming the protoxide and peroxide of iron, in the shape of nodular concretions, on certain points of the surface of iron,* while the remainder of the surface preserves unchanged its metallic state.

An investigation, having its origin in the electro-chemical theory, and the properties of alkaline solutions, has led me to the discovery of another kind of local concretions, produced by a series of still more complicated reactions.

A polished cylinder of soft iron was kept immersed, for a year, in a close vessel, in a solution of sub-acetate of lead, and consequently exposed to the influence of an alkaline reaction; for a short period, no signs of oxidation were observable, but it afterwards became stud-

were preserved, by the vapour of the ammonia mingling with the air above the liquid, during all the variations of temperature throughout the year. The solution contained 0.1 of ammonia. All the above mentioned concretions are composed of a mixture of hydrated protoxide and peroxide of iron; the proportion of the latter slowly increases.

* The preceding paper is the one referred to by the author.—*Trans.*

ded with a number of spongy, greyish excrescences, which presented themselves on a line parallel to the axis, (see preceding paper.) The remainder of the surface of the iron preserved, unaltered, its original appearance.

The concretions were made up of small particles, aggregated in the form of a metallic sponge, that presented the appearance and ductility of lead.

A slight friction was sufficient to unite the particles when separated, and to give the mass the brilliancy of that metal.

When flattened together under a slight pressure, and heated in a tube out of contact with the air, they melted, and hardened, on cooling, into a dross, that possessed all the properties of lead.

The liquid itself remained limpid and colourless throughout the year; afterwards, when exposed to the air, it quickly assumed a yellowish brown colour, which gradually deepened; it still possessed a feebly alkaline character.

A portion of the liquid being treated with sulphuric acid, acetic acid was developed. Another portion, by the action of a soluble sulphate, gave a precipitate of sulphate of lead, and the supernatant solution had all the properties of the salts of iron.

The tube in which the solution, and the immersed iron, were enclosed, contained, then, evidently, the following substances, present, at the same time, together.

1, sub-acetate of lead; 2, metallic iron; 3, lead, in the form of a concretion; 4, acetate of iron, partly acetate of the peroxide.

It appears to me to follow, from the preceding facts, that, at the points where, by the presence of foreign bodies, and interruptions in the continuity of the surface, the elements of a pile are constituted, the iron is oxidized at the expense of the oxide of lead, the latter metal being revived, and aggregating in concretions, at the same points, while the oxide of iron, united to its equivalent of acetic acid, diffuses itself in the liquid.

By the continuance of the same series of reactions, the volume of the concretions is augmented, while, by the alkaline reaction of the undecomposed sub-acetate of lead, the rest of the surface of the iron is preserved from oxidation, and is thus enabled to maintain its metallic lustre.

Report to the Directors of the London and Birmingham Railway Company, accompanied by Experiments on the Transverse Strength, &c. of Malleable Iron, with reference to its use for Railway Bars. By Peter Barlow, *Prof. Royal Mil. Acad., Woolwich.**

The accompanying paper contains the details of the experiments I have made, in conformity with the resolution of the general meeting of the proprietors of the London and Birmingham Railway Company,

* We are indebted to a member of the Institute, Gerard Ralston, Esq., now in London, for the opportunity of presenting thus early to our reader, the inte

held at Birmingham, on the 13th of February, and I am in hopes several important data and rules have been thus elicited. These will be found in the paper referred to; but it may be convenient to state the results in this place, referring to the paper for the experiments and investigation on which they are founded.

It has been ascertained that a malleable iron bar of any length is extended $\frac{1}{10000}$th part of its length by a direct strain of a ton per inch on its sectional area; and that, when strained with ten tons per inch, or when stretched $\frac{1}{1000}$th part of its length, its elasticity is injured, and the bar will not return to its original state.

Now, as the contraction of iron, between summer and winter, amounts to $\frac{1}{2000}$th part of its length, it follows, that the bars cannot be fixed permanently to the chairs and blocks, without great danger of drawing so much upon their strength, as materially to impair their efficiency for bearing a great passing load.

It follows also, as a consequence, that if the rails and chairs must not be permanently fixed to each other by direct means, it ought not to be attempted by indirect means, viz: by cotters, keys, or wedges; for either these will hold the rails to the chair, or they will not. If they do hold fast, they produce all the mischief which permanent fixing would occasion; and if they draw, then they do no good, although they may still do mischief; whence I am led to conclude, that the rails should have no greater attachment to the chairs than is sufficient for preserving them steady while the load is passing.

My next experiments were directed to finding the position of the neutral axis in malleable iron, for without this datum, the strength of rails, of differently formed transverse sections, cannot be computed and compared with each other, at least, without the expensive mode of having them first made, and then their strengths found by experiment. In this inquiry, as in the preceding, I have succeeded to my entire satisfaction, and, by the results obtained, have formed rules of very simple character, which will enable any person to compute with great precision the bearing strength of a bar of any proposed section within the limits of its elastic or restoring power, and also the amount of the deflection it will sustain under this or any lesser load. I have demonstrated by these means, that we may find certain practicable forms of parallel rails, which shall be, weight for weight, equally as strong as the fish-bellied rails, when loaded at their middle point, and, of course, stronger in every other part. For which reasons, and for others explained in my paper, I feel fully convinced that the parallel rail, formed according to the requisite proportions, is decidedly the best.

Such are the results of my experimental researches on this subject, and here, perhaps, I ought to close my report, leaving it to practical men to work out the conditions I have shown to be necessary; but I hope I may be allowed to offer some suggestions on a few prac-

resting and very practical report of Prof. Barlow, the publication of which is commenced in our present number. We beg leave to return our thanks to Mr. Ralston, to whom we have before had occasion to make acknowledgments for a similar favour.—Com. Pub.

tical points,—a task for which I feel myself the better qualified, by being a week associated with Messrs. Rastrick and Wood, in examining the models sent in for the prize, and thus benefitting by their practical skill and remarks; to which I may also add, the advantage I derived from examining so many models, several of them exceedingly ingenious, and accompanied with descriptions, containing very sensibly remarks on different modes of practice.

In the first place, as I have already stated, I am decidedly convinced that the rail should be parallel; that its whole depth should not be less than four and a half or four and a quarter inches; that the thickness of the middle rib should not exceed that, which is essential to the perfect manufacture of the bar; and that the lower rib, (without any reference to the distant contingency and dangerous proposition of turning the rail,) should be made of the best form for present purposes, viz: for giving to it a steady bearing in its seat.

With respect to the joint chair, I do not think any better form can be devised than *the whole* chair proposed by Mr. Daglish, viz: in which he uses no filling-up piece, but with a different wedge. It is my opinion, that, by well gauging both the ends of the rails and chairs, and then leaving the former free, we should best comply with the conditions I have endeavoured to show to be desirable, if not absolutely necessary.

To carry this into practice, however, so as to enable the rail to be removed, if necessary, it is essential that the pin, which holds the chair to the block, should be allowed to fall down into the stone, for which purpose the lewis-pin, proposed by Mr. Swinbourn, is well suited; but still I think that, combining this ingenious idea of fixing, with that proposed by Mr. Vignoles, a better effect might be expected; that is, instead of the lewis, I should recommend the large-headed bolt, with or without a loose washer, to cut a hole in the back of the block to the depth of about two inches, up which the head of the bolt may be passed, which would allow it to be dropped down when necessary, and admit of application in a more simple, and probably in a more effectual, manner than the lewis, if, as I have been informed, the latter is liable to split the block.

For the intermediate chairs, I think a slight modification of Mr. Stephenson's would best answer the purpose; that is, I would support the rail in the chair simply by the ends of two plain-ended pins, so as to give it the requisite steadiness with as little friction as possible. Of course, I would have these pins pointing horizontally, or upwards, instead of downwards, as they do in the chair in question.* I do not conceive such pins would be necessary in the joint chair, but provision might be made for them, and they could be applied, if necessary.

I have no doubt, practical men, who have taken a different view of this subject, and have thought it necessary to fix every thing as fast

* It may be worth consideration, whether, if this mode of fixing were adopted, it would not be practicable and advantageous to introduce pieces of felt, or other substance, within the seat of the chair, which would greatly subdue the jars that take place between metal and metal.

as possible, will see objections to the light fixing I have proposed; but without attempting to anticipate and answer those objections, I can only say, after having, I believe, heard every thing that can be advanced on the subject, that my opinion is such as I have stated.

I have, above, alluded to the gauging the ends of the rails, and the openings in the joint chair, and I have also spoken in the description of my experiments, of the advantage of keeping the blocks of the two lines of rails parallel. On all these points, it is probable I shall be considered by many as entering into refinements neither called for, nor practicable, in the case of rail-ways; but I would ask, why is it found that so much breakage takes place, and that so many repairs are rendered necessary? There is no theoretical reason why a heavy load, passing with great velocity, should cause more damage than the same load passing slowly, if the road were perfect; the mischief, therefore, is in the imperfect practical execution, and the disregarding small inequalities, as we would disregard them in common cases. It has, perhaps, never occurred to such persons, that a difference of level at a joint chair, between the two abutting rails, of only one-tenth of an inch, will, when the carriage is moving from the higher to the lower level, at its greatest speed, cause the wheel to pass the distance of a foot without pressing on the rail, and, consequently, throwing the whole weight, which ought to be borne equally by the two rails, wholly upon one; yet this is a fact resting on a natural law, and cannot be otherwise. To fall one-tenth of an inch by the action of gravity, requires one-forty-fourth part of a second, and in that time the carriage will have advanced a foot; consequently, for that space, the carriage has been borne by one rail only. It may be said there are springs provided, which assist gravity to bring down the wheel. I am afraid, however, after allowing for their inertia, that such aids are very inefficient; at all events, they furnish no arguments against having every thing as accurate as possible. Again, with reference to the abutting rails, I was certainly surprised when a gentleman officially attached to the Liverpool and Manchester Railway, informed me that, in some parts of their line, the rails were half an inch apart, and that it was not thought injurious. But why, I would ask, whether injurious or not, have them half an inch apart, when they never need be open above one-tenth of an inch, and, for more than half the year, not above one-twentieth of an inch, if proper care be taken in laying them down? Hitherto an idea has prevailed, that in laying down the rail, one-eighth or one-tenth of an inch must be left for expansion, and, whether hot weather or cold, the same allowance is made; consequently, if the rail is laid in the summer, the one-eighth of an inch becomes nearly a quarter of an inch in the winter, provided the contraction takes place in the same direction in two adjacent rails; but if in a contrary direction, it becomes half an inch, or nearly so, as my informant states the fact occasionally to be. To prevent this, I would, as stated in my experiments, have each rail fixed to one chair, and to one chair only; and I would have three steel plates, the thicknesses of the proper spaces, to be left between the rails, according to the temperature—one between 15°

and 35°, another between 35° and 65°, and another for all temperatures above 65°, whereby to regulate the distances of the rails. This, again, will, I have little doubt, be considered an unnecessary refinement; but to such objections I reply, that this accuracy costs nothing additional in the execution, and may, therefore, at all events, be as well attended to as not.

It only remains now for me to make a few observations upon the absolute requisite strength of the bars, and the tests of strength to which they ought to be submitted, before they are reported, and received as efficient.

First.—With respect to their absolute strength, the amount of this will depend upon the weight of the locomotive intended to be employed, which I shall here assume at twelve tons; and, notwithstanding six wheels may be used, I shall, for the sake of being on the safe side, consider only four, or that each wheel bears one-fourth of the whole weight, or three tons. I will also suppose that, whether my suggestions are acted on or not, cases may occasionally occur, when the weight, which ought to be borne equably on two rails, is, from irregularities in the road, thrown all on one. This gives the greatest bearing load six tons, and I would then have a surplus strength of fifty per cent., making nine tons; that is, I would have rails whose absolute elastic or restoring power should be nine tons, and I would test every rail to seven and a half or eight tons. Such a test would be perfectly harmless on bars of good iron, and, unless it is carried thus high, it is impossible to detect bars made of an inferior quality, which show more stiffness in the commencement than the best iron; but their elastic power at length yields suddenly, and the bar becomes useless. Such iron should, of course, be excluded, unless indeed it be contracted for, and the rails proportioned accordingly. This testing should be carried on in the line of works by a proper person, and the manufacturer left free to use his own plans without superintendence, as practised by the admiralty in the receipt of their iron cables. There can be no doubt that, if the cables were sent to sea without proof, and every failure of a link attributed to a want of sufficient dimensions, before this time we should have had cables for the several rates of vessels of much larger bolts than at present, thereby adding, at a great expense, much unnecessary and even injurious weight, as appears to be the tendency of the present practice in railway bars.

The proof I would recommend is as follows: On the line, near the place where the work is going on, all the intermediate chairs, in one length of rail, should be removed, and over this space, the bar for trial should be placed. A carriage, then, rightly adjusted for weight, and with wheels at a proper distance to bring the requisite strain on the metal, should be passed over twice, when, if no permanent deflection be observed, the bar is to be considered sound, and removed, and its place supplied by another, to undergo the same test. In this way, I consider that fifty or sixty bars a day may be tested at a very trifling expense; but it should be done under the superintendence of a person on whose report reliance may be placed, and to whom the other minutiæ I have mentioned might also be entrusted.

I mention this because, if the plan be acted upon at all, it should be followed up strictly, as well in justice to the company and iron-master, as to the proposition itself.

When the laying down has proceeded a certain distance, the chairs may be replaced, and those of another rail removed, to form a new testing ground nearer to the point of active operations.

I have considered the other suggestion for testing by percussion, but do not think it would be recommendable.

For the gauging, I would recommend an over and under gauge, according to the plan followed by the Ordnance Board, in the receipt of shot and shells.

I think it is possible, by a slight modification of the form of rail I have comprised in my fourth example, to give to it a strength of nine tons, without any increase of weight. I have allowed rather more metal for the head, I believe, than is generally employed, which, if transferred to the lower rib, would give all the additional strength required, or, perhaps, the centre rib might bear a slight reduction. At all events, leaving every thing as it is, except adding two pounds per yard to the bottom rib, the rail would come up to the whole strength of nine tons, as required. And here, I would observe, is the great advantage of working by rule rather than by opinion, for if we had only the latter to guide us, we should be hard to believe that an increase of one-twenty-fifth in the weight could be made to add about one-ninth to the strength and stiffness of the bar; yet such is unquestionably the case.

In conclusion, I feel it my duty to state, that, through the liberal permission of my Lords Commissioners of the Admiralty, I have had every convenience I could desire for conducting the experiments; that the London Committee have caused to be supplied every instrument and material I had occasion for; and that I have been much indebted to Messrs. Lloyd and Kingston for their cheerful assistance, and ingenious suggestions on various occasions. On my own part, I will only say, that I entered upon the inquiry without prejudice; that I have made the best use in my power of the means placed at my disposal; have faithfully recorded every result as it was noted down at the moment of observation; and that I am in hopes the laws and rules I have deduced are legitimate, and may be found useful, by enabling practical men to compute results which they have hitherto been only able to conjecture.

[TO BE CONTINUED.]

¶ *Remarks on Competition Plans for Buildings.*

Every person, whose attention has been in the least degree directed to architecture, must have observed that, in the present day, the practice of procuring plans for buildings, by public competition, is becoming more and more prevalent. It is, perhaps, only of late years that this custom has been generally acted upon; and it is more commonly employed in the case of public buildings, than in those of

a private nature. When a public building is about to be erected, the parties advertise a description of what is wanted, offering, generally, a premium for the best plan, or for that which shall be finally adopted. Sometimes the successful competitors have nothing for their reward but that of being employed to conduct the work, for which they are paid as in ordinary cases. The plans submitted are, or should be, distinguished by a private mark, referring to a sealed letter sent by the competitor, in which his real address is to be found; and it not unfrequently happens that there will be from forty to fifty of such plans sent in, varying, of course, in equally numerous degrees of merit. Not a few of these drawings are the result of great labour, seldom occupying the time of the competitor for less than three weeks, and, if the building be very extensive, and the design well matured, having employed his sole attention for months together. The unsuccessful competitor, consequently, sustains a very serious loss; as he is not like the landscape or figure painter, who can carry his drawings to the market; the plans of the architect can be of no use but for the purpose for which they were originally intended. In fact, there cannot be, in any other profession, a competition which requires such a sacrifice on the part of the competitor, as in architecture; and, were this sufficiently impressed on the public mind, there can be no doubt but the labours of the architect would, in all such cases, be more duly appreciated, and, at least, rewarded with an impartial distribution of justice.

It may here be remarked, that sufficient time is seldom allowed by the advertisers for preparing the plans; for it will be confessed by every architect, that the faults of his composition will be easier detected by himself, after it has been laid aside for a time; we should say, therefore, that six months, at least, should be given, or even a longer period, according as the subject may require.

Although the system of competition in architecture is accompanied with no small expense to the parties competing, yet it cannot be denied that, when rightly conducted, it is conducive to the greatest advantages to the public, and is the only true method of eliciting the brightest talents of the country, especially when the premium held out is of sufficient value to induce proficient architects to come forward with their works; and, surely, the erection of a building which is destined to continue for ages, standing forth to posterity as an example of the architectural genius of our time, is not unworthy of the most assiduous attention. The practice has also a beneficial effect, in affording to a young architect facilities, which he could not otherwise possess, of pushing himself forward. Private competition plans are sometimes required, where the competitors are previously chosen out, and where all are paid a certain amount for their trouble, whether successful or not; this is certainly the most liberal method, and should be adopted where the funds are sufficient.

In most cases where a decision is made on competition plans, the judges consist of men who are but indifferently qualified for the task, and whose fancy is easily carried away by a gaudy picture, the intrinsic merits of which they are incaple of appreciating; or, perhaps,

by a design which has nothing else to recommend it but that of being so commonplace in its character, as to be more familiar to their ideas than one of higher pretensions. Indeed, it is not to be supposed that men, whose pursuits of life are so totally unconnected with the subject, as never even to have led them to the inspection of a simple plan of a house, should be able to form a correct judgment of a number of elaborate drawings. It often happens, indeed, that the judges are so bewildered with the brilliant display before them, that they readily give way to some almost equally ignorant but pretending builder, to whom they look up as to the architectural oracle of their body, and who, it may be supposed, will not let slip such an opportunity of serving his own ends. This may, perhaps, be thought rather an uncharitable conclusion; but. certainly, there is but too much reason to fear that sinister influences have, in many cases, had an undue weight, and it is the particular object of this article to point out these grievances.

On such occasions as that we are just referring to, the most obvious method of proceeding, and that which would be the most entirely free from all suspicion of partiality, would be, to name two or more architects, of acknowledged celebrity in their profession, (and residing at a distance,) to whom the plans should be sent for final decision. Care should also be taken by all judges, in forming their decision, to keep in mind the terms of the competition; for, although the value or cost of the building required by the advertisement be strictly attended to by some competitors, yet there are others who will disregard it, and will produce an elegant design, although its expense should be double the stipulated estimate, and who, by this trick, may blind the judgment of the umpires, and carry off the prize.

The undue means which are sometimes resorted to by competitors to forward their own cause, are disgraceful in the extreme; some have been known openly to carry about their designs, for the purpose of procuring votes, before the general election; some unfairly attach their names to their plans, (instead of using a private mark, as they ought to do,) in the hope that their friends may exert undue influence in their favour, or from a vain confidence in their own importance, which leads them to expect that the name alone will produce a favourable impression; and some have even been known surreptitiously to withdraw their designs from the exhibition, in order to add improvements which have been suggested by the designs of another: nay, such is the total want of principle, and disregard of justice to the competitors, shown in some cases, that an instance could be brought forward where one of the competitors was appointed the judge! This competitor judge most naturally gave his decision in favour of his own designs, and the unsuccessful competitors were dismissed with the most cogent and satisfactory argument, that "the judge was a man of such respectability, that he would not have chosen his own design, unless he had considered it the best!" Is it possible to conceive that language could be so sophisticated as to apologise for such conduct? Thus it is that nine out of ten competitions are decided, and thus are the architects treated who have spent a large portion of their valua-

ble time for the benefit of the public. It must be acknowledged, however, that isolated cases occur, though few and far between, where no complaints of this nature can be made, and where fair play has been allowed to have had full scope. The Tron Church steeple, Edinburgh, erected, in 1828, by the architects Messrs. R. and R. Dickson, may be mentioned as an instance of fair competition; the choice of the plan reflects the highest credit upon the then magistrates of the city, who made their election from a great number of designs. Considering its cost, this steeple, for aptness, originality, and picturesque beauty, can scarcely be surpassed in any country. It would not be easy to cite many instances of the same kind in Scotland, but we may mention another, viz: Burns' monument at Ayr, by Thomas Hamilton, Esq., of Edinburgh. This is an exquisite gem of Grecian architecture, of which school its tasteful architect is a distinguished disciple. Finally, it is evident that the grievance here complained of, and which calls so loudly for redress, is in no way amenable to the civil law, unless in such a case as we have before hinted at, viz: where the judges do not abide by the advertised terms of the competition. Even in such cases, we are not sure how far they lay themselves open to have their proceedings legally called in question, so that an appeal can only be made to the moral rectitude of society; and we have no doubt that the evil only requires to be fairly exposed, to be, in time, totally eradicated.

Edinburgh, October, 1834.

¶ *Optical Delusion.*

It may not be uninteresting to the readers of your valuable journal, to be informed of a mechanical method which I have lately discovered, that enables the eye to distinguish objects when moving at great velocities.

Having conceived it probable that figures revolving on axes at right angles to their planes might be distinctly seen, I constructed an apparatus to determine the point, a short description and sketch of which I give you on the other side.

A drawing of Saturn and his belt, about five inches diameter, was then made, and caused to revolve at the rate of 2,500 times a minute, when the figure was found to be almost as distinctly visible as when at rest.

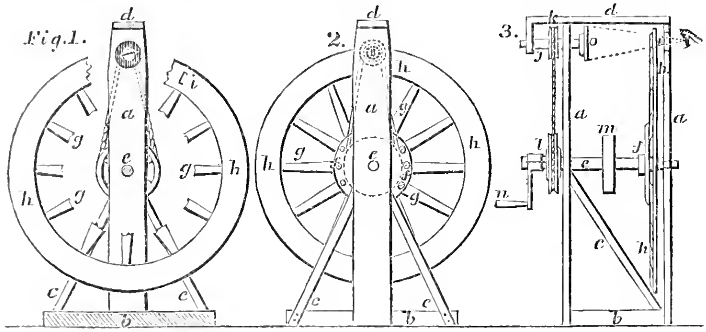
Other drawings were then tried, of a human figure, a toothed wheel, the number 1835, the letters R, R, &c., all of which were as distinguishable at that velocity as the first figure was.

It appears to me very likely, that the same results would be found if the velocity were increased to 10,000, or even 20,000, revolutions per minute. I am constructing another apparatus, founded on the same principle, which will enable me to put the correctness of this anticipation to the test of experiment.

Richard Roberts.

Manchester, Jan. 19, 1835.

Fig. 1, is an end elevation of the apparatus; fig. 2, is a sectional representation in the same direction; and fig. 3, is an elevation taken transversely; *a*, *a*, are two frame sides of wood, screwed to the base *b*, supported by the spur pieces *c*, *c*, *c*, and connected at top by the piece *d*. The main shaft, *e*, mounted in the standards, carries a cast iron disc, *f*, supported by twelve spokes, *g*, *g*, *g*, of wood, and to these spokes are nailed segments, *h*, *h*, of thin pasteboard.



In one of the segments a hole, *i*, is cut, one inch long by one and a quarter inch broad, and opposite to it another hole is made in the frame side, to which the spectator's eye is to be applied; *j*, is a small shaft, supported by one of the frame sides, and by a piece attached to *d*; and *k* is a pulley, two inches in diameter, to be driven by a band from the pulley *l*, of twelve inches diameter on the main shaft; *m* is a strap pulley, by which motion from any first mover may be communicated to the discs; *n* is a winch handle, of seven inches radius, by which 1000 or 1200 revolutions per minute may be given to the small disc, *o*, on the shaft, *j*, the centre of which is opposite to that of the eye-hole in the frame side. The small disc is of wood, and to it the figures to be viewed were attached. It will be evident that, if the large disc be set in motion, the small disc will be made to revolve at about six times the velocity of the large one; and as the centre of the eye-hole is about two feet two inches from the centre of the disc, the figure on the small disc will perform only the one hundred and ninth part of a revolution each time that it comes under the view, and will appear to be at rest.

Owing to the difficulty of making pulleys work with unvarying relation to each other, a kind of jumping appearance was produced, from a change of position in the figure; to obviate this, I used toothed wheels of six to one, instead of pulleys, and then the figure ceased to change its position. [*Lond. Journ.*

¶ *Compensating Pendulum.*

Annexed is a sketch of a compensating pendulum, the idea of which was suggested by the description of a lever pendulum, by Captain Forman, in your Magazine for last month.

The inconvenience of that proposed by Captain Forman, is apparent from a single glance; it is, in fact, of such a form, as to be rendered practically useless. The idea, however, of two bars of expansive powers in a duplicate ratio, acting upon a lever, to produce the effect required, is extremely ingenious; and availing myself of this hint, I proceeded to accomplish the same effect by means of *two levers*, so disposed that the form of the gridiron pendulum will obtain without its complicated mechanism, and the pendulum be practically useful.

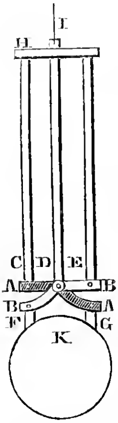
Trusting that the proposed plan may not be thought uninteresting, or unworthy a place in a work which has been so extensively useful to the artisan and mechanic, I beg to submit it to the consideration of your readers.

BENJAMIN HURLEY.

Portsmouth, *Nov.* 13, 1834.

Description.

A A, B B, are two levers, with equal arms, (in the sketch they are drawn bent, to show both.) The lever A A (shaded) is attached at one end to the rod C, and at the other end to the rod G, which connects it to the pendulum bob, K. The lever B B is, in like manner, attached to the rod E, and the connecting rod F. The pendulum rod, D, passes between the two levers at their centres, and a pin passing between all three, *i. e.*, the two levers, and the rod, connects them together, and thus fulcrums are formed for the levers. The pins in this case, as well as at the ends of the levers, should be fitted so as to admit of an easy motion upon them. The upper ends of the three rods are firmly fixed to the cross-bar A, and the pendulum swings in the usual way by the watch spring I.



The rods C and E are made of metal, composed of eight parts zinc, and one part tin. The rod D is made of steel, tempered; the whole of them are flat, about one-sixteenth of an inch thick, and brought to a knife edge. The expansion of the zinc rods are equal to 00269, that of the steel is equal to . . 00137; which is, as nearly as possible, in a duplicate ratio, and they may be made exactly so by hammering the zinc rods.

Assuming, then, that the expansive properties of the rods are in the exact proportion of 2 to 1, it will follow that, under any variation of temperature, the centre of oscillation of the pendulum will be unaltered, and a compensating pendulum be thus obtained, at much less trouble and expense than that of the gridiron pendulum, invented by Harrison.

I should recommend that the adjusting screws, for bringing the pendulum to the true time of vibration, should terminate in nuts, which may rest in a mortise cut quite through any part of the bob, such screws forming the termination of the rods F and G. This,

however, with other minutiæ as to the manner of finishing the joints of connexion, &c., may be safely left to the skill and ingenuity of any good workman, the principle alone requiring description.

[*Lond. Mech. Mag.*

¶*The Bruges Stove, as improved by Messrs. Cottam and Hallen. By Mr.* EDWARD COTTAM.

I send you sketches (figs. 1, 2, 3,) of the Bruges stove, as manufactured by Cottam and Hallen, who have found it to answer fully the statement given by them of it in your Encyclopedia of Architecture. It will do more with a given quantity of fuel than any other stove, having the means of stewing, boiling, broiling, roasting, and baking, at one and the same time, with a small quantity of coke or cinders from any other fire.

Fig. 1.

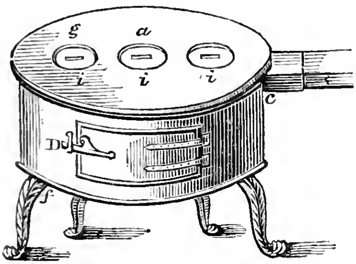
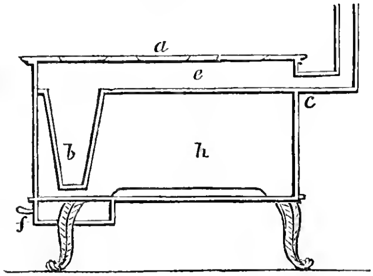
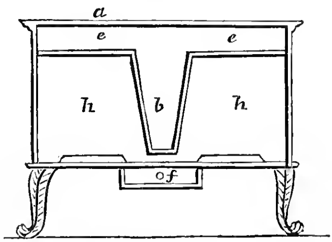


Fig. 2.



It is simple in form, and there is not the slightest difficulty in its use. The holes in the top may be arranged as is found most convenient for the situation in which the stove is to be placed, either in a line, as in the sketch, (fig. 1,) or in the form of a triangle. One thing is indispensable for the proper action of this stove, and that is, a good draught. It must, therefore, have a separate flue.

Fig. 3.



In fig. 1, 2, 3, *a* is the top of the stove; *b* is the fire pot; *g* is the hole for feeding the fire pot; *f* is an ash drawer; *c* is the flue: *d* is the oven door; *h* is the oven; *e* is a space for the fire to pass to the flue *c*, and for heating the whole of the top plate, any part of which will produce sufficient heat for culinary purposes; *i i i* have lids, which may be taken off, and the battery of stew-pans, or boilers, will then be in contact with the flame. A gridiron fits on any of these openings, which has the advantage of not smoking the article broiled, the draught being downwards.

[*Loud. Arch. Mag.*

¶ *Spires.*

The spire of a church, which had deviated from the perpendicular 5 feet 11 inches, and was split several inches apart a long way up the centre, has lately been set straight, and reunited, by Mr. Trubshaw. The spire was built on a naturally sloping situation, and its weight is estimated at about 1500 tons of stone. In all sloping situations, the lower side (whether of churches, towers, houses, or even walls or roads, unless the foundation be rock,) has a tendency to give way first, but more especially when the foundation, as in this case, was of two different kinds of subsoil. On the upper or fast side of the spire, the ground underneath was of slaty marl, while that on the lower side of it was of a sandy marl. Mr. Trubshaw, after examining well the outside of the foundations, commenced digging down the inside. After having got below the level of the footings, (lowest stones of the foundation,) "he proceeded to bore a row of auger holes clear through under the foundation of the high side, the holes nearly touching each other. These holes he filled with water, and, corking them up with a piece of marl, let them rest for the night. In the morning, the water had softened the marl to a puddle, and the building gradually beginning to sink, another row of holes were bored, but not exactly so far through as the first row. They were filled with water as before, and the high side not only kept sinking, but the fracture in the centre kept gradually closing up. This process was continued till the steeple became perfectly straight, and the fracture imperceptible.—*Weekly Dispatch, April 7.*
[*Loud. Arch. Mag.*

¶ *Iron Castings.*

Mr. Avery, the proprietor of a large iron foundry in Syracuse, state of New York, has ascertained, by a series of experiments, that if common fine sand is mixed with common blue clay, in the proportion of one-tenth part of clay to nine-tenths of sand, it constitutes the best possible composition for casting that can be used. Even the most delicate castings come out perfectly free of sand, and require no sort of cleaning by vitriol.—*Brattleborough Independent.*

List of American Patents which issued in May, 1835.

		May
251.	*Washing and wringing machine.*—John Snyder, city of Philadelphia,	2
252.	*Truss.*—Philip Hittel, city of Philadelphia,	2
253.	*Cutting straw, &c.*—William Denson, Center Spring, Morgan county, Alabama, ...	2
254.	*Rail-road carriages.*—Heinrich Backmann, Lancaster, Pa.	2
255.	*Washing machine.*—Philo Hunt, Sharon, Litchfield county, Conn.	2
256.	*Bungs, cutting, &c.*—George D. Gates, Hartford, Conn.	2
257.	*Printing press.*—Josiah Warren, Warwick, Tuscarawas county, Ohio,	2
258.	*Propelling wheel.*—Thomas Pierce, Hartwick, Otsego county, N. Y.	2
259.	*Comb teeth, cutting.*—Lemuel Adams, Reading, Fairfield county, Conn.	2

May

260. *Hat bodies, stiffening.*—Henry Blynn, Newark, New Jersey, 9
261. *Churn.*—Michael Knight, Pownal, Cumberland county, Maine, 9
262. *Silk throwing and twisting.*—Lucilius H. Mosely, Poughkeepsie, N. Y. 9
263. *Washing machine.*—Mitchell and Fairbanks, Readfield, Kennebec co., Maine, ... 9
264. *Sifting grain, &c.*—Armstrong and King, city of New York, 9
265. *Fleam for bleeding.*—Cornelius Addle, Winthrop, Kennebec county, Maine, ... 9
266. *Washing machine.*—Jacob Sayer, Harrisonburg, Rockingham county, Virginia, ... 9
267. *Cooking stove.*—Resor, Wade, and Resor, Cincinnati, Ohio, 9
268. *Thrashing machine.*—Sneed and Carpenter, Charlottesville, Va. 9
269. *Damask loom.*—Tompkins and Gilroy, North Providence, R. I. 9
270. *Diving apparatus, &c.*—John W. Fraser, Boston, Mass. 9
271. *Saddle seat spring.*—Baylis and Brannon, Fredericksburg, Virginia, 16
272. *Stoves.*—Charles. W. Peckham, New Haven, Conn. 16
273. *Hats and stocks stiffeners.*—Elisha Pratt, Cambridgeport, Mass. 16
274. *Water wheel.*—William Merrell, Randolph, Portage county, Ohio, 16
275. *Cotton seed, hulling, &c.*—James Martin, Petersburg, Virginia, 16
276. *Evaporating for salt.*—Edward C. Cooper, city of New York, 16
277. *Water wheel, reaction.*—John B. M'Cord, Galena, Illinois, 16
278. *Carriages and wheels.*—Williams and Wing, Hartford, Conn. 16
279. *Capstan.*—Calvin Oaks, city of New York, 16
280. *Rovings, &c. making.*—James Jones, Manchester, Great Britain, 16
281. *Thrashing machine.*—W. F. Pagett, Whiteport, Frederick co., Va. 22
282. *Lath machine.*—David M. Cradit, Ithaca, New York, 22
283. *Pump.*—Philo C. Curtis, Utica, New York, 22
284. *Locomotive engines.*—Charles and G. E. Sellers, city of Philadelphia, 22
285. *Stone sawing mills.*—Joseph L. Dutton, city of Philadelphia, 22
286. *Boiler for kitchens.*—John and W. C. Baily, Farmington, Maine, 22
287. *Paddle wheels.*—Benjamin M. Smith, Rochester, New York, 22
288. *Flour cooler, &c.*—Hebart, Catlin, and Abeel, Pomfret, New York, 22
289. *Oil, preventing absorption of.*—Nathaniel Hathaway, Fairhaven, Bristol county, Mass. . . . 22
290. *Lamp for volatile materials.*—George Eyles, Boston, Mass. 22
291. *Washing machine.*—John T. Denniston, Alexander, Genessee county, New York, ... 22
292. *Timepieces.*—William Pardee, Albany, New York, 22
293. *Weighing scales.*—Elias A. and A. Hibberd, Lunenburg, Vermont, 29
294. *Roller gin.*—William Whettemore, West Cambridge, Mass. 29
295. *Steam engine.*—John Kirkpatrick, Baltimore, Md. 29
296. *Cider mill, cast iron.*—Philip Pryer, Genessee, New York, 29
297. *Churn.*—Philip L. Lowell, Farmington, Maine, 29
298. *Thrashing machine.*—Edmund Warren, city of New York, 29
299. *Excavating machine.*—Nathan Currier, Methuen, Essex county, Mass. 29
300. *Furnaces for lime and ores.*—John Owings, Adams county, Pa. 29
301. *Brick machine.*—William Tucker, Luray, Page county, Va. 29
302. *Mortising machine.*—Ira Gay, Dunstable, Hillsborough co., N. H. 29
303. *Hat block.*—A. and S. Chichester, Wilton, Fairfield county, Conn. 29
304. *Planing sash staff.*—Ira Gay, Dunstable, Hillsborough county, N. H. 29
305. *Odometer.*—J. Fuller, and A. A. Richardson, Brunswick, Maine, 29
306. *Thrashing machine.*—Henry Johnson, Washington county, Tenn. 29
307. *Straw cutter.*—Stephen Ustick, city of Philadelphia, 29
308. *Cooking Stove.*—Hiram G. Phelps, Johnstown, New York, 29
309. *Cooking stove*—John C. Kolbe, city of Philadelphia, 29
310. *Power gaining machine.*—Philo C. Curtis, Utica, New York, 29

CELESTIAL PHENOMENA, FOR AUGUST, 1835.
Calculated by S. C. Walker.

Day.	H'r.	Min.					
5	10	48	N. App. ☽ and δ Sagittarii,	,3,	☽ S. 0′.9		
9	9	44	Im. τ' Aquarii,	,6,		N. 117°	V. 76°
9	11	4	Em.			299°	269°
9	11	31	Im. τ^2 Aquarii,	,5,6,		168°	141°
9	12	27	Em.			254°	239°
12	11	4	Im. 33 Ceti,	,6,		129°	91°
12	12	23	Em.			304°	261°
19	13	27	Im. 37 Gemini,	,6,		154°	107°
19	13	59	Em.			223°	176°

Meteorological Observations for April, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	42°	66°	29.70	29.75	W.	Moderate.		Hazy day.
	2	43	72	.75	.64	S.	do.		Clear—thunder & lightning.
	3	43	66	.60	.70	NE. S.	do.		Cloudy day.
	4	46	52	.65	.65	Variable.	do.		Cloudy—thunder and lightning.
	5	36	43	.30	.35	NE.	do.	0.43	Rain—thunder and lightning.
☾	6	49	43	.35	.35	W.	do.		Cloudy day.
	7	39	48	.35	.46	W.	Blustering	0.46	Clear—flying clouds—rain.
	8	46	68	.65	.70	W.	Brisk.		Clear day.
	9	49	68	.70	.73	W.	Moderate.		Hazy day.
	10	54	77	.75	.80	NW.	do.		Hazy day.
	11	47	65	.95	30.05	E. SE.	do.		Cloudy—lightly cloudy.
	12	39	66	30.10	.05	N.	do.		Hazy day.
☺	13	45	57	29.80	29.70	S. W.	do.		Cloudy—rain.
	14	35	40	.75	.76	W.	Blustering		Clear—flying clouds.
	15	28	50	30.00	.95	. W.	Brisk.		Clear—snow in the night.
	16	32	47	29.60	.55	E. W.	Moderate.	0.48	Snow, ground covered.
	17	31	40	.75	.85	W.	Blustering		Lightly cloudy—snow squalls.
	18	30	43	30.10	30.23	NW.	Moderate.		Clear day.
	19	34	48	.15	.00	SE.	Variable.		Lightly cloudy.
☽	20	56	70	29.60	29.40	SW.	Brisk.		Cloudy—lightly cloudy.
	21	40	57	.80	.85	NW. SW.	do.		Clear day.
	22	43	60	.75	.70	Variable.	Moderate.		Clear—cloudy.
	23	37	53	.85	:.90	W.	do.		Clear—cloudy.
	24	35	49	30 05	30.10	NW.	do.		Clear—frost—clear.
	25	41	49	29.66	29.80	SE.	do.		Cloudy; drizzle; thunder & light'g
	26	38	41	.75	.80	SE.	do.	0.10	Rain—cloudy.
⊗	27	43	58	.95	.96	SE.	do.		Cloudy—rain in night.
	28	37	49	.22	.45	NW.	Blustering	1.80	Rain—snow—flying clouds.
	29	45	69	.80	.83	W.	Moderate.		Cloudy—clear.
	30	52	68	.86	.80	E.	do.		Cloudy day.
	Mean	41.17	56.07	29.74	29.76			3.27	

		Thermometer.	Barometer.
Maximum height during the month,		77. on 10th,	30.23 on 18th.
Minimum	do. .	28. on 15th.	29.22 on 28th.
Mean	do. .	48.62 .	29.75

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

AUGUST, 1835.

Notice of an article in the "Boston Mechanic," respecting the decreased resistance to boats at high velocities.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—In the June number of the Boston Mechanic, under the head of "Iron Boats," in accounting for the fact that boats, of a certain construction, when drawn at high velocities, require less force (in proportion) than when propelled at a slower rate, the writer lays down the following *principle*, to wit: "This is on the principle that the *forward velocity*, for the time being, *diminishes*, or rather counteracts the force of gravity, in the same manner as the centrifugal force does in the revolution of a circular body, or as the skater, when going swiftly, is able to pass safely over places where, if he stopped for a moment, his weight would inevitably carry him through the ice."

Now, this may be very plausible doctrine, but is not, in my opinion, according to established principles.

To say that the centrifugal force of a revolving body *diminishes* the force of gravity, is to say that a horizontal wheel, (a common top, for instance,) balanced in a pair of scales, would weigh less when revolving, than it would at rest; and the assertion that the forward motion of any body, in a horizontal direction, *counteracts the force of gravity*, is denying the validity of a well-established law of projectiles, viz: that any body, (a cannon ball, for instance,) projected horizontally

from an elevated position, will fall to the level of the earth in the same time that another body, let fall from the mouth of the cannon, would reach the earth. In other words, two balls, leaving the cannon's mouth at the same instant,—the one discharged in a horizontal direction, with any given velocity, and the other suffered to fall by its gravity alone,—would always maintain an equal elevation, so long as they remain unobstructed in their progress.

I apprehend that, in the case alluded to, the lightness of the boat at high velocities is due to the *relative* motion of the *boat and water*, and that it is perfectly immaterial whether the boat moves over the water, or the water passes under the boat, in which latter case the rising of the boat could not be very properly attributed to the "counteraction of gravity by its forward motion."

The example of the skater has not supported the position of our author, for it must be remembered that ice is usually supported by water, for the displacement of which, *time* is requisite; besides, if unsupported by water, *time*, proportionate (inversely) to the degree of pressure, would be required to part it.

Who has not witnessed the gradual giving way of timbers, ropes, and other substances, by the continued action of uniform pressure?

Respectfully,

R. Tyler.

Reply to a Question in regard to the Use of the common Thermometer, for ascertaining the Temperature of the Hot Air Blast for Iron Furnaces.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—An inquiry having been addressed from very respectable iron masters, in regard to the use of the mercurial thermometer as a measure of the temperature of the hot air thrown into blast furnaces, I beg leave to reply, as requested, through the pages of your Journal.

By reference to the reports of MM. Gueymard and Dufrenoy, translations of which have been given in this Journal, it will be seen that the air thrown into the furnaces, the operations of which are referred to by them, varied in temperature, in different cases, from about 300° Fah. to 612° Fah. As mercury boils at 656 Fah., under atmospheric pressure, the vapour which will fill the part of the instrument above the mercury in the stem, will not begin to exert a force, unbalanced by atmospheric pressure, to burst the tube and bulb, until the temperature rises to that point. The common thermometer is, therefore, entirely applicable, for practical purposes, to all lower temperatures. In fact, if the bulb were not made very thin, the instrument might be used for such purposes considerably above this temperature.

To apply the common thermometer conveniently, the bulb should project below the scale, and if high temperatures are to be measured,

without endangering the instrument, it should have a range of scale somewhat above the highest.

A very convenient mode of applying the instrument, would be to insert an iron tube, say a piece of gun barrel, closed at the bottom, and open at the top, so as to fit a hole made in the upper part of the air-pipe, through which the hot blast is passing, this tube to pass down to the middle of the pipe. Into this, mercury being poured, and the thermometer dipped into the mercury, the temperature of the air within the apparatus can be ascertained at any moment, and then the thermometer removed from danger of accident. In such a case, unless the bulb is thin, great care is necessary, in reintroducing the instrument, to prevent its fracture, and, at all events, particular pains should be taken that no moisture is upon the bulb, when it is first dipped into the mercury.

An alloy of tin and lead may replace the mercury at high temperatures, and one of tin, lead, and bismuth, might be used as low as 210° Fah., without preventing the removal of the thermometer. Olive, or whale, oil will answer to quite a high range, and will be found convenient even above 400° Fah. Even when the instrument is not to be removed, this mode of arranging it prevents leakage at the joint through which the instrument passes, and danger of fracturing the tube in tightening the packing.

As a substitute for this tube arrangement, a thin sheet-iron cup, fastened by clay on the top of the air pipe, and containing mercury, or some substitute for it, will give, by a thermometer dipping into it, an approximation to the temperature of the air within.

In conclusion, we would observe that, if our friends in the interior use the hot air blast, only at 200° Fah., they are far from realizing the good effects which it is capable of producing; they would not be fully obtained by going 100° higher.

Should any further information, in reply to the question in hand, be desired, the same channel of communication will afford all that is in the possession of,

Yours, respectfully,

* * *.

Committee on Inventions.

Report of the Committee on Inventions, of the Franklin Institute, on the Trough Rail invented by S. V. Merrick, of Philadelphia.

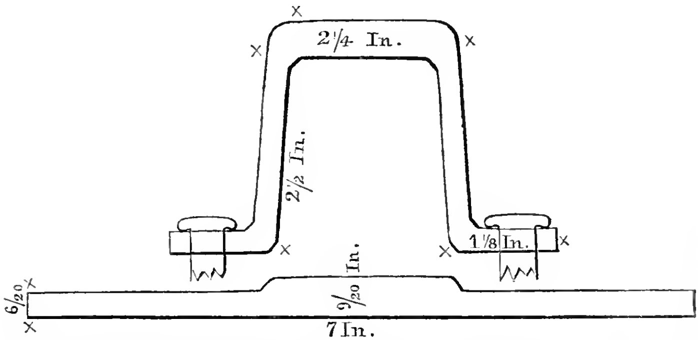
The Committee on Publications having learned that some question has been raised as to the correctness of a note appended to Mr. Strickland's report, published in the April number of this Journal, (see vol. xv., p. 228,) deem it an act of justice, both to Mr. Merrick and to themselves, to publish the annexed report of the Committee on Inventions, presented to the Institute in December, 1831.

The publication of this report has been delayed until the present time, in consequence of the paper and drawings having been placed,

for examination, in the hands of D. B. Douglass, Esq., Civil Engineer, by whom they have been but recently returned to the Institute. The drawing of the rail described in the following report, was submitted, by Mr. S. V. Merrick, to the Committee on Inventions, July 25, 1831.

COM. PUB.

The Committee on Inventions, to whom was referred the examination of a method of forming iron rails for rail-roads, presented by Mr. Samuel V. Merrick, of Philadelphia, REPORT:—



That the method under consideration contemplates the construction of rails in the form of a trough, two and a half inches deep externally, and two and a quarter inches wide at the base which forms the top, or bearing surface, of the rail, and two and a half inches wide at the part which rests on the chair.

Each edge of the trough is turned over into a flanch, one and an eighth inch broad, and having the extreme edges four and a quarter inches apart. This gives the expansion of the trough one-fourth of an inch in the course of its depth, tending to brace it laterally. The flanches serve to support and steady the rail, and to receive the bolts which are to fasten it to its appropriate bearing. The trough is thus inverted, when placed in its seat, and the wheels of the car run on what would be its bottom, when in the erect or natural position.

It is proposed to form this *trough rail* by first rolling a bar of iron seven inches wide, and three-tenths of an inch thick, except a portion two and a quarter inches wide along the middle, where it is to be $\frac{45}{100}$ths of an inch in thickness, passing it between grooved rollers, adapted to reduce it into the peculiar form already described. There appears to the committee but little doubt that a rail of the form and dimensions here presented, would be found abundantly adequate to the purposes for which it is designed; the only questions are, *first*, the practicability of reducing bars into that form, with a preservation of necessary accuracy; and, *second*, the weight of the bar, compared with rails of other forms already in use. There will probably be found little difficulty in rolling iron of this form, when we consider the

numerous and various figures which bars are already made to assume, under the powerful action of the rolling mill, and by knowing the exact weights of English rails of different descriptions, we are enabled to make a calculation and comparison of those rails with the one now proposed.

A transverse section of the rail under consideration, will measure 2.41875 square inches; consequently, a rail 15 feet long would contain $2.41875 \times 180 = 435\frac{3}{8}$ solid inches,

Rolled iron has a specific gravity of 7.77, and the cubic inch weighs $4\frac{49}{100}$ ounces avoirdupois, so that a rail 15 feet long would weigh $435.375 \times 4.49 = 1954.22775$ ounces, or $122\frac{55}{100}$ lbs.

By reference to several rails described by Mr. Wood, in the recent edition of his treatise on rail-roads, it will be seen that wrought iron rails used in Great Britain, are formed to weigh from 157 to 196 lbs. to the length of 15 feet. Hence it appears that, even with an increase of more than one-half in the area of its section, this rail would be still lighter than the heavier English rails.

By order of the committee.

William Hamilton, *Actuary.*

Dec. 12*th*, 1831.

FRANKLIN INSTITUTE.

Monthly Conversation Meeting.

The eighth conversation meeting of the Institute, for the season, was held at their Hall, May 25th, 1835.

Mr. Titian R. Peale exhibited a model of Redheffer's "*perpetual motion,*" the moving power being a spring concealed in one of the columns supporting the machine.

Messrs. Benjamin Slater & Co. exhibited a governor for a steam engine, invented by N. Scholfield, of Montville, Conn.

Mr. Isaiah Lukens showed a large magnet, belonging to Mr. F. Peale, arranged for obtaining the shock upon the plan described by Prof. Emmett,* the magnet being part of the electrical circuit. The shocks were unpleasantly strong, being about equivalent to those of a half pint Leyden jar, fully charged.

Mr. John Skirving submitted to the examination of the meeting, specimens of needles, in their various stages of manufacture, from the wire to the finished needle—also, the tools by which they are made—and explained the process of making them.

Mr. J. K. Smith, of Pottsville, Pa. exhibited a model of a rail-road car, provided with self-acting brakes, of several different constructions. These brakes are intended to take effect when one car strikes another, preventing thereby the serious accidents which have occurred by the breaking of the axle of one of the train of cars, by the locomotive running off the road, &c. This brake has been submitted, for examination, to the Committee on Science and the Arts of the Institute.

* Silliman's American Journal of Science, vol. xxiv., p. 78.

Messrs. Sergeant & Bashford, of Brooklyn, New York, exhibited specimens of handles for copper kettles, &c., pressed from rolled iron, which were well finished, and of good form.

Mr. Jonas Colburn exhibited and explained a mortising machine, invented by Mr. George Page.

Committee on Science and the Arts.

Report on Mr. Thomas S. Ridgway's Smelting Furnace.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, the model of a Furnace for smelting iron, by the use of anthracite coal as fuel, invented by Mr. Thomas S. Ridgway, of Pottsville, Schuylkill county, Pennsylvania, REPORT:—

That they have carefully investigated the peculiarities in the structure of the model submitted to them; they have likewise reflected upon the theoretical views entertained by the inventor, regarding the supposed operation of a furnace upon the plan proposed.

The characteristic feature in Mr. Ridgway's furnace, is the possession of three combined stacks in lieu of one, the two lateral stacks being designed to receive the materials, and to retain them until they shall have undergone a certain supposed change; after which, they are to be transferred to the lower part of the central stack, to receive the direct action of the blast.

The middle stack is to be filled, to a small height only, with the substances for fusion, while the lateral stacks are intended for a twofold action, to relieve the fusing materials from the load of matter usually above them, which burden, by compressing together the smelting mass, he conceives to operate as one of the chief impediments to success, in the reduction of iron by anthracite coal. The other end to be accomplished by the side stacks, is that of preparing the ore for its final reduction, by keeping it at a moderate temperature, and promoting the chemical process, of purifying and carbonizing the ore, and assisting the action of the flux.

There are doors at the bottom of the side stacks, for the purpose of taking out the ore and coal after these preliminary changes, and transferring them to the smelting fire at the bottom of the central stack.

Doors of communication, furnished with valves, between the bottoms of the side stacks and the central stacks, permit the introduction of the draft from the fire into either, or both, of the side stacks. It is intended thus to effect a change in the ore in these lateral stacks, by bringing in contact the carbonaceous gas from the fire, and by excluding, as in the common furnace, the materials from access of oxygen.

In reviewing these ideas of Mr. Ridgway, the committee think that it is by no means proved that the cause of failure in attempts to smelt by anthracite coal, has been the pressure of the burden of the furnace upon the materials in fusion. The slope of the boshes of a

furnace may be such as to relieve the melting matter from nearly all pressure by the burden above.

In the next place, the committee are not convinced that any materially beneficial effects can be supposed to arise from the transmission of the blast or draft through the ore and fuel in a separate stack, which would not result in a stack of the ordinary construction. On the contrary, the loss of temperature incident to the causing the draft to quit the central stack, will, in all probability, prove rather prejudicial. They would, moreover, state it as their conviction, that the chemical views implied in the communication of the patentee, are wholly unsound.

He seems to expect important chemical changes to take place from the passage of carbonaceous matter in a gaseous state through the ore. Before it can be shown that *any* such chemical reaction can arise, he must first establish at what temperature the substances in these lateral stacks can be sustained. There can be little doubt that it would be one far short of the *fluxing point*, and the committee conceive that it has not been proved that any important change can take place in the ore, until that point has been attained.

When this is effected, the carbon present with the ore is certainly as capable of completing the process, by deoxidizing the ore, as any carbonaceous matter in the gaseous state, elaborated in a separate chamber.

By order of the committee.

William Hamilton, *Actuary.*

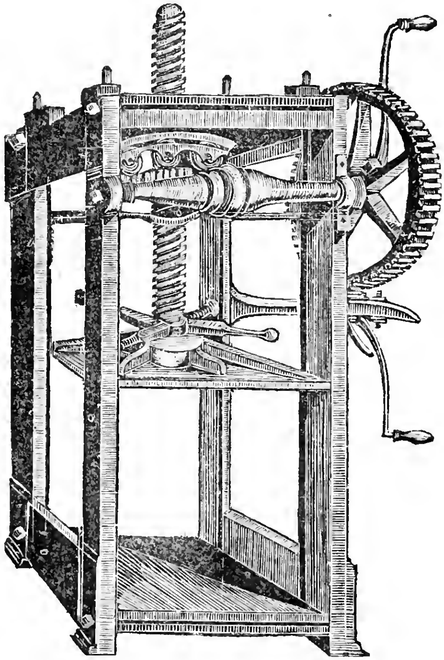
May 14th, 1835.

Report on Mr. Joel Barnes' Standing Press.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Standing Press, invented by Mr. Joel Barnes, of Philadelphia, REPORT:—

That this press embraces the following combination of the well known simple machines, viz: a single screw in the centre of a cast iron frame, moving vertically through a nut or box in the upper part of said frame, which box is supported, when the press is not in use, on a cross plate below, and, when in action, is kept down by the upper head of the frame. To the box is attached a toothed wheel, of cast iron, on the upper surface of which, continuous with the surface of the box itself, is placed a circuit of ellipsoidal friction rollers, kept in their places by a flanch on a movable ring of iron, and playing between the upper surface of the box, and the under surface of the top plate of the frame. By the arrangement thus far described, it will be perceived that the screw may rise and fall by revolving on its own axis, carrying with it the platten, attached to its lower extremity, by means of a knob, or head, of well known application. The screw is made to revolve by four arms, fastened to the body thereof, just above the platten. With this arrangement, the machine, in point of action, differs in no respect from the common screw press, but may be quickly turned in either direction, involving no

serious loss of time in bringing the platten to and from its work. When, however, the pressure becomes too intense to allow the workman longer to turn the screw, the arms just mentioned are made stationary by a plug, or plugs, set into the platten, and the box itself is turned by means of a horizontal tangent screw, applied to the toothed wheel already described. It is now that the friction rollers come into play, preventing, to a considerable extent, the resistance which would otherwise proceed from the action of the box against the roller in the top block, within which it plays. The axis of the screw has a winch of convenient length, by which it may be turned as long as that is found practicable; and it also carries a toothed wheel, which is capable of being acted on by a pinion of much smaller diameter, that may be thrown into gear at pleasure, and to which the winch may be then transferred. This third and last mode of giving motion to the press, is only required when extreme pressure is to be communicated.



The committee think the advantage of three rates of speed in this press, will commend it to the attention of manufacturers, who have often found cause to complain of the loss of time involved by the common hydrostatic press, with a single forcing pump, and equally so, by those screw presses in which the whole range of motion was to be effected by a comparatively slow process.

As the inventor does not confine himself to any particular scale of dimensions, we have not deemed it necessary to make a statement of the calculation applicable to the press which we have examined, further than to remark, that it multiplies the force applied 10,000 times, and, when operated on by a single man, capable of applying sixty-six pounds, may, exclusive of friction, apply a pressure amounting to about 200 tons.

By order of the committee.

WILLIAM HAMILTON, *Actuary.*

June 11*th*, 1835.

Report on Mr. Joseph Dando's System of Book-keeping.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a system of Book-keeping, practised by Mr. Joseph Dando, of New York, REPORT:—

That Mr. Dando has presented four books, which are intended to effect a system of book-keeping by double entry, without the numerous *postings* required by the old Italian method. The chief novelty is to be found in what Mr. Dando styles a Journal of Settlements, which takes the place of the nominal accounts in the leger, and enables a good book-keeper to establish the correctness of his books in an easy and expeditious manner. The committee are of opinion that this system might be advantageously introduced into many establishments, where the long and tedious method of the old Italian system, or the ordinary system of single entry taught in the schools, is used, and cheerfully recommend it for the patronage of those who desire a certain and speedy process for keeping their commercial records.

By order of the committee.

WILLIAM HAMILTON, *Actuary.*

June 11*th*, 1835.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN JANUARY, 1835.

With Remarks and Exemplifications, by the Editor.

1. For a *Stove for Cooking with Anthracite Coal;* Abraham D. Spoor, Coxsackie, Greene county, New York, January 7. (See specification.)

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2. For an improvement in *Stoves for Burning Anthracite, and other Fuel;* Abraham D. Spoor, Coxsackie, Greene county, New York. First patented March 15th, 1834; patent surrendered, and reissued upon an amended specification, January 7.

We gave an account of this stove at p. 200, vol. xiv., and made some remarks respecting what we considered as defects in the speci-

fication, and these it has been the design of the amended specification to cure. Since that period, we have had an opportunity of testing this stove, and have found it to answer the purpose intended admirably well. The draught of heated air is directed downwards along the front, and then backwards along the lower part of the stove, whence it ascends to the pipe, heating, in its passage, the lower part of the stove, which renders it very comfortable to the feet, whilst, at the same time, before the heated air reaches the pipe, a more considerable portion of the heat is given out into the room, than is usually the case, and thus admitting the employment of a short pipe, without the great loss of heat generally sustained from that cause.

The subjoined quotation, including the claim, will afford a general idea of the particular construction of certain parts, to which we have not alluded in the preceding remarks.

"In the foregoing description, I have made known the manner in which I construct my stove, and in so doing, have necessarily included many things of which I do not claim to be the inventor; I, therefore, now proceed to state specifically in what my improvements consist, and they are as follows.

"I claim the use of a flat rotary grate, having protuberances on its upper surface for jostling the coal, and thereby separating the ashes, with the general arrangement and construction of the respective parts for sustaining, tilting, or rotating, the same, through an avenue in which the shaker is inserted, as described.

"I claim the internal reverberating flues, situated within the body of the stove, by means of which, whilst the fire is surrounded by brick, or other imperfect conductor of heat, the draught, or current of air, after it has passed through the ignited coal, is brought into contact with the principal portion of the interior surfaces of the metallic plates which form the exterior surface of the stove, being first conducted downwards, then backwards, and then upwards, and thus heating the lower as well as the upper parts thereof; combining the aforesaid reverberating flues with the opening in the diagonal plate, by which the draught may be at once carried into the smoke pipe during the time of igniting the fuel, or whenever the same may be desired.

"I claim the placing or locating of the transparent door above the burning fuel, instead of below, or opposite to it, as heretofore practised.

"I also claim the general arrangement and combination of the respective parts, by which the above named improvements are rendered effective, whether constructed precisely in the shape or manner described, or varied in any way in which similar effects are produced by analogous means."

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3. For a *Churn;* Iram Brewster, Schoharie county, New York, January 7.

There appears to be some novelty about this churn, but that, we apprehend, is its only merit. The description and drawing are both imperfect, and every thing like a claim has been omitted. Accord-

ing to our understanding of the thing, there is to be a vertical tub, as in the common churn, and within this, at a proper height from the bottom, a shaft, having a crank on each end of it, crosses the churn, and carries revolving dashers. Above the top of the churn there is a similar shaft, with two cranks, which shaft is to be turned by a winch. Pitmen connect the upper and lower cranks, so that, when the upper shaft is turned, the lower may likewise revolve, their gudgeons working in the side pieces of a vertical frame, which extends down to the bottom of the churn.

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4. For a *Thrashing Machine;* Luke Hale, Hollis, Hillsborough county, New Hampshire, January 7.

It is manifestly incorrect to pronounce a judgment upon what we do not understand, and we are, from this consideration, compelled not to condemn the machine which the specification before us is intended, but altogether fails, to describe. The claim is to "the manner in which the machine is arranged," which, it is to be hoped, very far excels that of the description.

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5. For an improvement in *Cook Stoves, for correcting the smell, and improving the quality and flavour of the articles cooked therein;* Eliphalet Nott, Schenectady, New York, January 7.

(See specification.)

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6. For *Applying Gum Elastic in Sheets, or Gum Elastic Cloth, to Vessels and Buildings;* George D. Cooper, city of New York, January 7.

The caoutchouc is to be used "to prevent vessels and buildings from leaking, and to preserve the crews of vessels from the effects of dampness caused by the salting of vessels."

We are told to take the material, and to "divide it and run it into sheets one quarter of an inch thick, and of such length and width as the owner or builder may elect, or else to import the sheets ready cast from Para, the place where the gum elastic is produced." These directions are more easily given than followed, and it would have been very satisfactory to have been told how to "run it into sheets" of the desired length, breadth, and thickness, without impairing its quality. To get such sheets made by the persons, and in the places, where the gum elastic is produced, would be no easy task; we, however, will suppose this to be done, or the India rubber cloth which is prepared in this country, by covering canvass on one or both sides with that material, to be substituted therefor, agreeably to the directions of the patentee; this material is to be applied "between the inner part of the ribs, and the inner planking; between the outer part of the ribs, and the outward planking; between the outward planking and the copper; and between the deck beams and the deck planking."

Particular directions are given for laying it on, which we need not

repeat. In covering houses, the sheets are first to be laid upon rough plank, uniting their edges by dissolved gum elastic, and then shingling, or slating, over the whole, "so that the roof, &c. is not only water tight, but air tight."

There is no claim made, but the thing intended to be secured by letters patent, is the interposing the gum elastic between the sheathing and other parts of vessels, and between the boards and outward covering of roofs. It may, no doubt, be very advantageously applied to some of the purposes designated, but in others the test of experience can alone determine its utility. Under shingles, for example, the retaining of the water may tend to rot them very rapidly; and it is not impossible that the agents to which it will be subjected when used under water, may operate upon it disadvantageously; it, however, is well worth the trial.

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7. For a *Self-regulating Combined Pendulum and Lever Power Engine;* Sidney Woods, Freeport, Cumberland county, Maine, January 7.

We had, by accident, taken up the description of the machinery, No. 14, before examining that of which the foregoing is the title, and to that article we refer, as containing opinions which are perfectly applicable to the plan before us, so far as mechanical principles and utility are concerned. The present patentee, after describing a combination of wheels, pinions, levers, weights, and a pendulum, claims the aforesaid "combination of levers and pendulum, from which results the power or effect described in this specification." It would be altogether a waste of time to attempt to explain this combination, as any one, although totally ignorant on the subject of mechanics, may at once direct the construction of a machine which will give quite as much power as that before us. He cannot possibly begin at the wrong end, or make any mistake in the combination, provided he does not aim at any improvement, but is content with equaling the patentee.

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8. For *Taking Measure for Coats, &c.;* Allen Ward, city of Philadelphia, January 7.

The specification of this patent enters too deeply for us into the science of coat cutting, and it is accompanied by nearly as many diagrams as are to be found in the first five books of Euclid; and after all the description given, there is not any claim made, and we are, therefore, left to the conclusion that this great work is, in all its parts, perfectly original.

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9. For a *Spiral Spring Churn;* Lewis Hinkson, Hallowell, Kennebec county, Maine, January 7.

This is a *very simple* contrivance, consisting merely in a plan for working the common dasher churn by means of the foot. The churn is to stand between two uprights, having a cross bar at top; the dasher rod is to be attached to a sliding frame, working between these up-

rights, like a saw frame; a rod descends from this frame, having a projecting piece on its lower end, upon which to place the foot, to bring the dasher down; and upon removing the foot, two spiral springs, fixed to the frame, raise the dasher. The claim is to "the application of the spiral springs, and the peculiar form and construction of the machinery for moving the dasher, as applied to this purpose."

We doubt much the approbation of the dairy-maids in substituting the foot for the hand, in this operation, as we think that the fatigue produced will be, at least, fourfold.

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10. For an improvement in the *Cotton Gin;* William S. Cooley, Norwich, New London county, Connecticut, January 7.

The improvement claimed under this patent consists in forming the ribs, or grating, between which the saws work in the common saw gin, of cast iron, and case hardening them; in all other respects, the gins are to be constructed as heretofore. The advantages stated to result from this improvement, are, increased durability and firmness; ease and simplicity of construction; perfect uniformity of shape, and a considerable diminution in their cost.

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11. For an improvement in the *Machine for Planing Boards*, patented by William Woodworth; Artemas L. Brooks, Lowell, Middlesex county, Massachusetts, January 7.

In Woodworth's machine, the boards are planed on one side only at one operation, but for many purposes it is desirable that both sides should be planed, and the boards reduced to a uniform thickness, as, for example, in preparing them for packing cases. The present patentee is the owner of a right to Woodworth's machine, and his improvement consists in passing the boards between two sets of revolving cutters, one above and the other below them. The lower set revolve in a sliding frame, affording an easy mode of adjusting them to the thickness of the stuff to be planed. The thing claimed, is "the employment of two cutter wheels for the purpose of planing both sides of a board or plank at the same time, in the manner set forth, employing a double belt, or any other convenient mode, for giving motion to the said cutter wheels."

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12. For a self-operating *Ink Distributor;* John Maxson, Schenectady, New York, January 9.

Various machines have been patented for the purpose of inking the form in the common hand press, without the aid of a second person; but, after a fair trial, they have generally been abandoned, as they are liable to get out of order, and do not execute the work as uniformly as by a roller boy. The machine before us is spoken of as though it had no predecessors, and the end to be attained, as though it had previously been unattempted, which, as we have already intimated, is incorrect. Considerable ingenuity is manifested in the plan before us, and the machine is sufficiently novel in its construction to maintain its claim to a patent, but we do not see in it any thing cal-

culated to obviate the objections which experience has shown to exist against those which have been tried. To describe it without the drawing, would be difficult, and would interest but few of our readers.

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13. For a portable *Press for Tobacco, Cotton, Hay, &c.;* Alexander J. Murray, Annapolis, Anne Arundel county, Maryland, January 9.

This press is intended to act horizontally, and the power employed is that of the screw. A frame is made, consisting of two parallel side timbers, framed into stout head blocks at each end. Between these side timbers, the hogshead to be filled with tobacco, or other receptacle, is placed upon a suitable cradle. A cylinder, called a false hogshead, of about the same diameter with the hogshead, is also placed upon the cradle; this false hogshead is to hold a sufficient quantity to fill the hogshead, when pressed. A follower is to be forced into the false hogshead by means of the screw, and this screw works in a frame which crosses from side to side, sliding upon the parallel side pieces, and capable of being fixed on any part of them by means of pins passing through holes, adapted to the purpose. When the screw has forced the follower down its whole length, the sliding frame, or block, which advances with it, is confined by means of the pins; the screw is then turned back, and a block, against which it bears, is advanced so as to make a new start, and this is repeated until the pressing is accomplished. The claim is to the general arrangement, as described.

We think that this press will be found to be inferior to several others already in use, and, indeed, that it will not answer the purpose for which it appears to be principally intended, the pressing of tobacco. This article requires to be laid in the hogshead with much care, and to be packed in successive portions, and very uniformly; how it is to be so laid in a horizontal cylinder, we do not perceive, nor do we believe that the power applied will suffice to pack the whole contents of a hogshead uniformly and firmly, throughout, at one operation.

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14. For *Machinery for Propelling Mills, &c.;* Obed R. Marston, Jana, Genessee county, New York, January 9.

This is a most absurd project, at least as absurd as the attempt at perpetual motion itself. The defectiveness of the specification, and the incorrect manner in which the oath is worded, might otherwise be subjects of regret, more especially the former; but as the whole thing is "less than nothing, and lighter than vanity," irregularity and inconsistency in the manner of presenting it are scarcely noticeable. The applicant swears the oath prescribed by law both to a citizen, and also to an alien; but even this double fortifying will be of no avail in the attempt to turn dross into gold.

"The machinery is put in motion and propelled by means of weights raised by tackle power and a windlass, regulated as to its motion by either air or water. The wheels are constructed on a scale of one inch to a foot, and the whole machinery upon the same plan. The

gearing to be made so as to answer the several uses and purposes to which the machinery is to be applied. The regulator is an empty barrel, with a leather stopper, so as to fix with certainty the motion and speed of the machine, by the means of air or water passing out of or into the receiver, through a tube. It is to be attached to the machinery by means of a pitman and crank, and the whole construction of the machinery to be made agreeable to the mode herewith sent."

The foregoing comprises the whole description, and the drawing represents seven wheels and eight pinions, regularly geared together, with a drum, or barrel, and windlass at one end of the train, to wind up a weight, and a crank and pitman at the other, working a piston in a cylinder, which is to be the regulator. We do not write for those who need any thing further to show the utter worthlessness of the whole affair.

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15. For a *Churn;* Francis Colton, city of New York, January 9.

This is an old affair, and the patentee does not claim it as new, but merely describes the manner in which he constructs it. There are two dashers working in one box, the dasher handles being moved up and down by two cranks upon a horizontal shaft above them, a winch being employed to turn the crank. This churn is called a double dasher churn,—a name which has been anticipated, as well as the thing itself.

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16. For an *improvement in the art of Manufacturing a Double Acting Cylinder Pump;* Phelps Mix, Germantown, Philadelphia county, Pennsylvania, January 9.

A double acting pump of the ordinary construction is described, but nothing is claimed as new in this instrument, the mode of manufacturing such pumps being, it seems, the invention of the patentee, and this consists in casting the parts of which they consist, in metal moulds, made so accurately that they may be put together without being further wrought. Block tin, zinc, or lead, in any proportions, are spoken of as suitable metals; a mixture of one part of block tin, to three of zinc, being preferred. The claim is to the "manufacturing the double acting cylinder pump, by casting it in parts in moulds perfectly finished, and so formed that the different parts may be easily put together by soldering and bolts."

We have more than once had occasion to remark upon a patent of this kind, and have expressed the opinion fully that it is one which cannot be sustained, as there is not any thing new either in the thing made, or in the mode of making it. The casting of syringes, pumps, and other articles of that description, in metal moulds, in a state ready to be put together, is altogether old; but it is assumed that double acting pumps have not been so cast, and, granting this to be the fact, if a patent can be sustained for it, it will follow that, for casting in sand from any pattern new in its form, a founder might obtain a valid patent,—an idea which, to us, appears most palpably absurd.

17. For *Spiral Window Springs;* Munson L. Stevens, Waterbury, New Haven county, Connecticut, January 9.

A tube containing a spiral spring, is to be let into the window frame, opposite to the edge of the sash, which tube forces out a sliding catch, which falls into notches on the edge of the sash, a roller being placed at the bearing point, to diminish the friction; on the outer end of the catch there is a thumb piece, by which to depress it when required. The claim is to "the application of the spiral tube, and the contracted and compact form of the spring and catch, as above specified." This we should view as a claim to the application of the spiral spring only, as the contracted and compact form make no part of the construction, but is merely a result of such construction. The specification, although describing a simple thing, is altogether laboured and obscure.

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18. For *Open Grates, and Stove Grates, for Burning Anthracite Coal;* Elias W. Newton, Middletown, Middlesex county, Connecticut, January 9.

The patentee calls his invention a sliding grate, that is, one which is capable of being made to traverse back and forth, so as to shake out the ashes; this is to be effected by resting the grate upon ledges, and allowing it room to play; a handle being attached to a rod, or pin, which passes through the side of the stove for that purpose.

In Nott's stove, the grate is made to rock, and in Spoor's, to vibrate in a horizontal curve, and in the present, with a sifting motion; we do not recollect that this last has been before made the subject of a patent, but we apprehend that there is not that substantial difference between the vibrating in Spoor's manner, and that now described, upon which to found a claim to invention. The present differs from Spoor's mode no further than was necessary to apply a vibrating motion to a square grate, whilst his, from the construction of the stove to which they are applied, is round.

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19. For an improvement in *Stoves;* Elias W. Newton, Middletown, Middlesex county, Connecticut, January 9.

By this improvement, it is said that "the heat, which has hitherto been in a great degree lost, may be applied to the boiling of water, and generating of steam for culinary and other purposes, while at the same time it increases the durability of the stove." It consists in casting the back of a stove hollow, so that a space of two inches, or thereabout, may be left between two plates, which thus form a boiler for containing water. Near the bottom of this reservoir, there is a tube, by which the water may be withdrawn, and at its top another tube, leading into a boiler, the top of which is on a level with it, so that water may flow freely from one into the other. The improvement is intended to be applied to stoves of various kinds, and the arrangement must, therefore, be changed, to adapt it to the construction of the stove employed. Neither this, or the former, specification contains any claim.

The same gentleman to whom this patent has issued, obtained one on the third of last month, (December, 1834,) for a hollow back to furnaces, stoves, and fireplaces, which he then distinctly claimed, see page 20. As there cannot exist, at the same time, "two valid patents for the same thing," the foregoing has been incorrectly obtained. It was probably the intention of the patentee to take a patent for an improvement, only, on his former plan; but this he has not done, as he has not set forth distinctly in what his improvement consists, separating the old from the new, and confining his claim to the latter, as the law requires.

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20. For a *Rake Tooth Machine;* Giles Dayton, of Blandford, Hampden county, and William Stedman, of Tryingham, Berkshire county, Massachusetts, January 13.

A mandrel, which may be made of wood, is so mounted as to run in collar heads, in the manner of a lathe mandrel. The end of this is bored of a proper size and depth for a rake tooth, the hole being made trumpet mouthed. Three cutters are fixed to operate upon the piece to be formed, one of them in the mouth part, one, of about three inches in width, in the straight part, and one beyond this, which rounds off the point of the tooth. The timber is cut into lengths of about five and a half inches, and rived into pins of about half an inch square; these, held in a clamp made for the purpose, are passed into the revolving mandrel; they are then reversed in the clamp, and passed in again, so as to round the part left in the first operation. About four or five thousand can thus, it is said, be prepared in a day.

There is no claim, and the whole machine is, therefore, patented; cutters of this kind have been before used in revolving mandrels, but still the particular adaptation of the apparatus to the purpose designated, is, if new, which we believe it to be, a proper subject for a patent.

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21. For an improvement in the *Rotary Steam Engine*, and an improved boiler for generating steam; Ethan Baldwin, city of Washington, District of Columbia, January 13.

We gave a brief notice of the rotary engine patented by the same gentleman, on the 28th of January, 1833, upon which this is said to be an improvement, but to us it appears that the present engine is as distinct from the former in its particular arrangements, as many of the rotary engines which have been patented, are from each other. It will be seen by turning to vol. xii., p. 31, that, in the former engine, folding valves were used to close the annular cavity, or chamber. In the present engine, the valves, four in number, are to slide into the body of a solid revolving cylinder, much in the manner of those in Bramah & Dickinson's, patented in England in the year 1790; the valves in the present instance, however, are each distinct in its operation, not being united with that which is opposite to it. These valves are to slide in and out by their own gravity, or rather, as we should suppose, they are to slide out by the centrifugal force under

which they will operate, in their rapid motion, and to slide in by the action of the curved part, called by the patentee a bulk head. Stuffing is spoken of as intended to be applied to the valves, but it is mentioned rather as a thing of experiment than of certainty.

We are in this, as in the former patent, left altogether to conjecture respecting what it was intended to patent, no part of the apparatus described being claimed, nor any distinction made between what is old, and what is supposed to be new. On this point, and some others, we refer to the concluding remarks made on the former patent, as indicating the opinion entertained by us of the present machine. We shall be glad to find ourselves in error, as we hail all real improvements, and, in the present instance, take a friendly interest in the success of the patentee.

The boiler described is, in its general construction, like that of Stevenson, as used in locomotive engines, but with certain specified variations. The fireplace is to be in the form of a semi-cylinder, and entirely within the horizontal cylinder constituting the boiler, its flat side being uppermost, and below the water line. Vertical tubes are to pass through the top and bottom of this fireplace, to admit water through them; and horizontal tubes, from four to six inches in diameter, are to be placed as in Stevenson's boiler. The top of the cylinder is to have flues of sheet iron extending along it, conducting the heated air passing through the tubes, back again to the front, and then again to the back of the boiler, before it escapes at the chimney; these, of course, heat the steam only. Many advantages are enumerated, which are expected to result from a boiler so constructed, that we are very apprehensive will never be realized; we think it liable to many objections, and among them would name the vertical tubes in the fireplace, and the large size of the horizontal tubes. There are some points noted by the patentee, for example, hooping the boiler to prevent explosion, which we have not room to introduce. As regards this boiler, as well as his rotary engine, the patentee has neglected to discriminate between the new and the old, having described the affair as though the whole was original, which is very far, indeed, from being the case.

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22. For an improvement in the *Nippers of Reed's Nail Machine;* Stephen Chubbuck, Wareham, Plymouth county, Massachusetts, January 13.

"This improvement consists in having the nipper to play upon a pin in the upright post through which it passes, and is therefore called a *joint nipper*, which admits of a vertical as well as horizontal movement." This improvement, the advantages of which are set forth, is said to be applicable to some other nail machines, and is claimed generally.

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23. For *Machinery for Propelling Saw Mills, &c. &c.;* Irby Jones, Natchez, Mississippi, January 13.

This is intended for a horse power, although we are told that steam

may be applied to it, and so indeed it may, and to almost any thing else, with equal advantage.

A circular rail is to be made, upon which a heavy wheel is to roll, being drawn round by a horse. A horizontal shaft, attached to this wheel, extends to the centre of the circle, and, by means of bevil gearing, gives motion to a vertical shaft. We do not now recollect more than two patents for precisely the same thing, although there are some others which are very nearly related to it.

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24. For machinery for *Breaking the Husk of the Coffee Berry;* Isaac Adams, Boston, Massachusetts, January 13.

This machinery consists of two horizontal plates of cast iron, the upper of which has an eye through it, and is surmounted by a hopper. These plates are to be furrowed, so as to break the husks with the greater certainty. The distance between the plates may be varied, in order to adapt them to berries of different sizes. The upper plate is made to revolve, motion being communicated to it by a shaft passing through the lower plate.

Another modification of the apparatus is mentioned and represented, in which, instead of the upper revolving disk, a wheel with arms, carrying conical rollers sustained upon springs, is made to revolve, so that the rollers shall bear upon and crush the husks, without breaking the berries.

We should suppose that common stones, and some of the hulling machines consisting of similar disks, furnished with asperities, would answer the purpose equally well with the first described apparatus. There are, in fact, machines so much like it, as to leave for it but little claim to originality, excepting as applied to coffee berries.

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25. For machinery for *Breaking the Husk of the Coffee Berry;* Thomas Ditson, Boston, Massachusetts, January 13.

This apparatus resembles many of the machines for hulling clover, and other seeds. The berries are to be put into a hopper, whence they pass between a cylinder and concave, covered with punched sheet iron; thence between another cylinder and concave, covered with wire cards, and, after this, between a vertical revolving and a fixed hollow cone, the former of which is covered with projecting nails, and the latter with punched sheet iron.

The patentee says, "I claim separating seeds, or kernels, from the husks, by the several operations and machinery above described, *in connection.* And, *separately*, I claim the invention and use of a cylinder covered with sheet iron, having holes punched in it, as herein above mentioned, for bruising or breaking in pieces, the outer shell or covering of the coffee berry. Also, the invention and use of a cylinder or frustrum of a cone, into whose inner surface nails are inserted, and which is surrounded by an exterior casting of sheet iron, punched full of holes, so that jogged edges shall be raised on the inner surface, for the purpose of scratching or rubbing off the inner husk of the coffee berry."

Cylinders and concaves, covered with sheet iron, have been so long known and used, that we do not see how they can now be called an invention. We think the claim would have been more safe, had it left off with the general combination.

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26. For a *Percussion Cannon Lock;* Robert Beale, city of Washington, District of Columbia, January 13.

The claim made will serve to show the intention of the patentee, which is absolutely to close the touch-hole, by holding the hammer down after the stroke.

"What I principally claim, is this said cleat, or catch, which, by the aid of the spring attached to it, closes over the top of the hammer simultaneously with the explosion, and completely prevents the re-action of the hammer. The reaction of the hammer in all the locks heretofore made, has formed the objection to the percussion cannon lock."

This lock has been, and is still, under trial, but we understand that some objections to it exist, which have not yet been obviated, although the inventor expresses his confidence that he will be able to remove them; should there be a final report in its favour, we shall gladly make the fact known.

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27. For a *Machine for Hulling Clover Seed;* Stacy West, Hartford county, Maryland, January 16.

Two cylinders are to be made of wood, say thirty inches long, and seven inches in diameter, and the surfaces of these are to be made rough by a covering of punched sheet iron, or otherwise; they are then to be placed in a trough, in which they are to stand parallel to, and nearly in contact with, each other, but inclined at an angle of about ten degrees with the horizon. Each of them has under it a semi-cylindrical concave, with its surface roughened in like manner. By means of a cog wheel on the gudgeons of each cylinder, they are geared together, so that, when the necessary power is applied, they will revolve towards each other. A cover fits on to the trough, and has a hopper at its upper end, to receive the seed to be hulled. Provision is made for adjusting the boxes in which the gudgeons revolve, so as to regulate the position of the cylinders.

The claim is to "the mode of working the machine, and the manner in which the cylinders are arranged." What is meant by "the mode of working the machine," we do not know, as it is intended generally to work it by means of a strap passing around a whirl.

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28. For a *Machine for Churning and Washing;* Ira Park, Delhi, Delaware county, New York, January 16.

A vessel in the form of a common churn, or in that of a barrel, is to be fixed in a frame, so as to revolve with its axis at an angle of about 45° with the horizon, there being a gudgeon on the centre of its bottom, and another on the lid, which lid is movable. There are to be projecting ribs on the inside of the vessel, extending from top to

bottom, in order to increase the agitation; these may project inwards about an inch.

There is not any thing new, either in the construction or the position of this machine, and the patentee has not preferred any claim.

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29. For a *Machine for the Cure of Dyspepsia;* Charles Wood, New Bedford, Bristol county, Massachusetts, January 16.

This machine consists of a table, or platform, upon which the patient is to stand, and where he is to take hold of a couple of handles, by which he is to work a swinging part of the apparatus backward and forward. This swinging part consists of two vibrating bars, which are attached, by pivots, one on each side of the table, their upper ends being united by a cross bar, forming the handles. The weighted lower ends are to rub or strike against certain obstructions projecting from the table legs, and by this means, "a sudden jerk will be given to the muscles of the arms and chest, thus exercising them in such a manner as to restore its tone to the stomach, and, of consequence, health to the patient."

There were in existence, before this patent was obtained, several machines adapted to the same purpose, which every one had the right, if they had possessed the disposition, to use. One of them is technically known under the name of a wood axe; another of them is denominated a saw, and there is a set of them called a maul and wedges. We have also heard of the application, in certain country places, of what are there known under the names of a hoe, and a spade, which are said to be very good stimulants and tonics. In the use of these, withal, it is believed that the result of the exercise is productive of other benefits, besides that accruing immediately to the patient. As in other chronic diseases, however, perseverance is an ingredient in the remedy absolutely necessary to its success; and if this be added by the patient, to the above mentioned applications, they will, we are assured, answer quite as well as the patent machine.

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30. For a *Cooking Stove;* Sylvester Parker, Troy, Rensselaer county, New York, January 16.

It is said in this specification, that the direct action of the fire upon the plate which forms the back of the furnace, and the front plate of the oven in the stove commonly called the "three boiler flat cooking, or jews' harp stove, soon destroys that plate, and is productive of other inconveniences; to obviate which, the present patentee, instead of casting the lower plate flat, makes it with a bend, or rise, in the form of an inverted U, crossing the plate just at the termination of the furnace, one side of this U forming the back thereof, whilst the other forms a part of the front of the oven. The hollow of this bend is thus exposed to the action of the external air, which prevents its undue heating. For the same purpose, a similar space is left between the upper part of the division between the furnace and the oven.

"What I claim as my invention and improvement in the above

described stove, is the mode of separating the furnace from the oven by the bend, or upward curve, in the bottom plate of the stove, as above described, so as that part of the back of the plate which is exposed to the action of the fire on one side, may be open to the air on the other, thereby preventing undue heat, and the consequent injury and destruction of the plate. And also preventing the front plate of the oven from coming in direct contact with the fire, as is the case in stoves of the ordinary construction, thereby preventing the undue heating and consequent injury of the oven."

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31. For a *Portable Stove and Culinary Heater;* John Iggett, Albany, Albany county, New York, January 16.

The body of this stove is to be made of tin, or of sheet or cast iron, lined with tin. The furnace slides in under the bottom, and over this there is a flue running either way along the bottom of the oven, then up through vertical pipes near each end, into a flat flue between the top of the oven, and the top of the stove. Above the vertical pipes are openings for kettles, and the heated air may be carried off by a common pipe in the centre of the top. The oven, or body of the stove, may be closed by folding doors. Several variations, both in form and substance, are described, very much at length, and many things are claimed individually, after which comes the following general claim.

"And the said John Iggett further claims the application of the inverted basin, or heater, box grate, heat and conducting pipes, rotary shaft and shelves, movable top upon the heater, the division of the oven into different apartments, and all and singular the various modes of constructing the same hereinbefore described, either with a round, square, oval, oblong, any and every shape, box or stove, heater, tank, vessel of any and every description, whereby the operation and action of the heat is the same as hereinbefore described." This is sufficiently broad and sweeping; but it is one thing to make statements in a brief, and another to sustain them by testimony.

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32. For a *Machine for Extracting Stumps;* Henry Gordon, Fountain Dale, Adams county, Pennsylvania, January 16.

A frame is to be made of stout plank, which is to be set up vertically near the stump to be raised, between parallel planks or timbers making a part of this frame; a long and stout lever extends in a horizontal direction; there are two rows of pin holes in the two cheeks of the frame, and the pins passed through these serve as fulcra for the lever, the pins being passed alternately through each cheek, in such a way that, by depressing one end of the lever, and raising the other, it will itself be made to travel up the frame, and to carry with it one end of the stump lever, attached to its centre by a suitable hook. The outer end of the stump lever is fastened to the stump by dogs, or otherwise, and this, as it is raised, rolls the stump over; or the outer end of the stump lever is to extend beyond the stump, and to rest upon a block, when, by raising it, the stump is drawn upwards. A second vertical frame is sometimes used, with a lever to

operate upon that first described, and thus, by their combination, to increase the power.

Machines of this description may be advantageously used in certain situations, but in most clearings, where the ground is heavily timbered, the stumps and roots would offer more difficulty to the farmer or planter when distributed over, than when in, the ground, as they would neither roll or burn.

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33. For a *Washing Machine;* Stillman Roberts, Portland, Cumberland county, Maine, January 16.

The body of this machine is to be in the form of a cross, with gudgeons in the centre, on each side of it. There is a full and particular account of it given, which ends with, "I claim as my invention, the standards on which the machine runs, and the *close* trunks or arms, and the fluted grooves, or bars, across the ends, together with the door for inserting, and taking from the machine, the articles to be washed." Which standard and door are precisely like a thousand others. We also, very lately, described a revolving box for a washing machine, in the shape of a cross, but this, though somewhat less old than the standards and door, is not claimed.

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34. For an improvement in the *Endless Band for a Horse Power;* Jonathan L. Stanley, and James C. Howard, Winthrop, Kennebec county, Maine, January 16.

A band is to be made of sole leather, and upon this the slats are to be fastened, upon which the horses are to tread. A system of cylinders and friction rollers, the gudgeons of which rest on the side pieces of the frame, are used to prevent the swagging of the endless band. The claim is to the "plan of making and using a band of *sole leather*, as above described, and also the plan or system of friction rollers, and cylinders for preventing the swagging of the endless band, and to diminish the friction of the drums, as above specified."

We should apprehend that the dirt and moisture which must pass between the slats, would be very troublesome upon the leather band, as this will effectually prevent their passing through.

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35. For a *Currying Knife Trimmer, and an improvement in forming the edge of the Currying Knife;* Luther Townsend, Farmington, Kennebec county, Maine, January 16.

This currying knife is to have one flat side, and to be beviled on the other, like the edge of a chisel, instead of being, as usual, beviled on each side. The edge is to be turned towards the flat side, which is to be made perfectly smooth, and is always to remain so. "The advantage of this alteration in the shape of the knife consists in this, that it requires the turned edge to be but half as long as in the common knife with two bevils. On this plan, an edge half as long will take a rank hold of the leather, will last much longer, and will cut abundantly easier, than on the plan in common use."

The trimmer is an instrument used to sharpen and smooth the

edge of the knife which is turned on one side. It consists of two plates of cast steel, fixed into a small wooden stock, by means of a wedge inserted between them, and so formed and placed, that, by drawing them over the edge of the knife, they turn a smooth edge thereon. A description of its precise form and use, would require more space than we can allot to it. We have no doubt that this instrument is a good contrivance for the intended purpose, but are unable to follow the patentee in his views, as regards his improvement in the form of the knife. We cannot see any difference in its action, whether beviled on one or on both sides. The bevil becomes a flat side by extending it to the back of the knife, and the angle of the edge may be the same, whether both sides, or only one, is beviled, and the effect produced by it must be the same in either case, although the position in which it is held must be varied; by a diagram, we could easily demonstrate the correctness of these observations, but hope that we may be understood without it.

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36. For a machine for *Cutting Sausage Meat;* James Burns, and John Walter, Waynesboro, Franklin county, Pennsylvania, January 16.

This bears the appearance of being a good instrument for the purpose intended, and it is certainly a very compact one. A hollow cylinder, closed at each end, has within it a revolving cylinder, or rather frustrum of a cone, extending from end to end. The meat is put into a hopper near one end of the instrument, and is discharged through an opening on the under side, near the opposite end. There is a system of fixed knives within the hollow cylinder, and upon the revolving cone are spirally placed studs, or wings, by which the meat is, in its passage, completely minced. The parts, as we have already intimated, are arranged with much skill. The claims are limited to those peculiarities in the construction, which, so far as we know, are new. A neighbour, who has tried the machine, was perfectly satisfied with its operation.

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37. For an improvement in *Trunks and Settees;* Benjamin Morris, New Richmond, Clermont county, Ohio, January 16.

The trunk and settee described in the specification of this patent, are designed principally for travellers in steam and canal boats. The trunk is made to fold up in a peculiar way, and the articles placed in it have compartments adapted to the special purpose of rendering them secure. The settee, which is in general intended to accompany the trunk, is so constructed that the latter may be safely stowed below it, the whole taking but little room. The settee unfolds, so as to be readily converted into a comfortable berth, furnishing its own mattress.

The upper part of the trunk encloses a thickness of cork, intended to give to it a degree of buoyancy in water which will sustain 180 lbs., thus fitting it not only to float with the property contained in it, but also to save its owner from drowning in case of accident.

The whole apparatus is described without any claim being made; all the arrangements, therefore, must be considered by the patentee as new. We would suggest that, instead of a mass of cork three feet long, two feet wide, and eight inches in thickness, there might be a hollow space, lined or covered with India rubber cloth; this would be at the same time both cheaper and lighter than the cork.

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38. For an improvement in the *Bee Hive;* Samuel Morrill, Dixfield, Oxford county, Maine, January 16.

This patent is taken for some variation of, and improvement in, the form of the hive contrived by the same gentleman, and described by us at p. 173, vol. xiv. In noticing that patent, we observed that the thing claimed was altogether old, that is, the formation of combs in vessels of glass. We do not think it necessary to detail the proposed variations in the form of the hive, as they are merely an extension of the principle upon which the hive was originally constructed.

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39. For *Heating Reverberatory or Puddling Furnaces, with Anthracite Coal;* M. Brooke Buckley, Pottsville, Schuylkill county, Pennsylvania, January 16.

(See specification.)

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40. For a *Bedstead Machine;* Aaron Stedman, Pittsford, Monroe county, New York, January 16.

This bedstead machine is intended to cut a right and a left handed screw on the opposite ends of bedstead rails, and also to cut female screws into the posts to correspond with them. The things claimed are, "First. The cast iron augers, with the cutters dovetailed into the same. Second. The boxes or plates accompanying the augers. Third. The caps upon the screw tools, to regulate the cutting of the screw. Fourth. The standards, or head block, and heel block, with the screws attached to the same. By means of these improvements, the screw in the ends of the rails, and the nuts or boxes in the posts, are always cut uniform, so that the bedstead will in all cases come together with close joints."

Bedsteads screwed together in the way proposed, are not so good as those furnished with good screws of the common kind, or as those that have some of the dovetailed wedge fastenings which have been patented. Notwithstanding the contrivances described by the patentee, screws formed of wood, on the opposite ends of a rail, will not uniformly strain up together. The patentee uses what he calls an auger, of cast iron, for cutting the female screws; this auger does not differ from the tools in use for the same purpose, unless the making them of cast, instead of wrought iron, is to be considered a patentable difference.

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41. For a *Machine for Bending Mast and Truss Hoops;*

Jonathan Mulford, Northern Liberties, Philadelphia, Pennsylvania, January 16.

A cylindrical pulley, or chuck, of iron, is fixed on to the end of a horizontal shaft, with which it is made to revolve, the shaft being turned by means of a wheel and pinion, operated on by a winch. A small roller, formed upon the end of a second shaft, parallel with, and directly above, the former, bears upon the pulley, or chuck, around which the hoop is to be bent, and is borne down upon it by means of weighted levers. The iron passed between these is secured to the chuck by passing under a staple, where it is fastened by a wedge. Upon turning the machine, the iron will be drawn in, and bent into a circular form.

There is not any claim made, and the machines for bending hoops, tire, and other articles, are so numerous, that the patentee certainly ought to have designated the character by which this machine is to be distinguished from others.

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42. For a *Machine for Shelling Corn;* Robert Gray, Northfield, Merrimac county, New Hampshire, January 21.

In this machine, the corn is not to be shelled by a revolving motion, as is generally done, but by passing it between rubbing boards, armed with iron teeth, formed by driving stout wires, or brads, into them. These boards stand vertically in a suitable frame, and one of them is to be worked up and down by a lever moving like a pump handle; whilst the other is borne up towards it by four springs, which adapt it to the size of the ear. The upper edge of the fixed board slopes out, to allow of the feeding of the corn from a hopper, or feed hole, above it. A riddle, below, serves to separate the corn from the cob.

"I do not claim as my invention, any of the parts of the machine taken separately, nor do I claim the performing of the operation of shelling and cleaning simultaneously, this having been before effected. But what I do claim, is the general arrangement and construction of the shelling part, consisting of the two shelling boards, lever, and springs, constructed in the manner, and operating upon the principle, hereinbefore described and set forth, without regard, however, to any particular dimensions or materials, or to the precise form given to the respective parts."

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42. For a *Grist Mill, or Conical Grinder;* Hezekiah P. and Pouncey Nuckolls, Barren county, Kentucky, January 21.

This is to be a cast-iron mill, and it is made so much like some others, that it would be no easy task to find the part in which its novelty lies. We are told that "the said conic grinder is suitable to grind all manner of grain, of which we claim to be the inventors, so much of it, however, as relates in a particular manner to the cone and runner, and their operation together, and no more." The patentees can, no doubt, see something peculiar in their conical nut and shell, but they not having pointed directly to it, we are unable to find it out.

43. For a *Saw for Sawing Staves, and other cylindrical work;* Harvey Holmes, New Marlborough, Berkshire county, Massachusetts, January 21.

The sawing is to be effected by means of a hoop saw, sustained upon friction rollers, in a way which we have had occasion to describe more than once; but the present patentee thinks that he has improved the apparatus, by causing the gudgeons of the friction rollers which sustain the saw, to run upon other friction rollers. He claims "the application of the second set of friction rollers, or wheels, for the journals or axles of the first named set of friction rollers, or wheels, to run or revolve upon their surface, to prevent friction, and thereby to accelerate the speed or motion of the saw, so as to enable more work or business to be performed in the same time, than by any other machine."

We know not in whom the right to the hoop saw vests, but if not in the present patentee, his so called improvement will not secure it to him. We are of opinion, however, that the additional friction rollers will involve more loss by their complexity, and the expense of their construction, than they will repay by diminishing friction. It will be found, in practice, that many of these wheels will stand still, and allow the gudgeons to revolve upon their surfaces, more especially when saw dust, or other foreign matter, adheres to them. For some preceding remarks on a saw of this kind, see vol. xv., p. 93, and vol. xiii., p. 121.

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44. For a *Machine for Cutting Straw;* Nimrod Murphree, Nashville, Davidson county, Tennessee, January 21.

In this machine, the patentee claims "the arrangement of the machinery in general, being, as I believe, both in form and mode of operation, entirely new." It consists of a wheel, which is to be made to revolve horizontally, and having a cutting knife upon its upper surface, extending from the centre to the periphery. Above the horizontal wheel, there is a vertical box, or feeding trunk, into which the straw is to be put, and some other appurtenances, which we do not think it necessary to point out, as nearly the whole of them may be found in our notice of a straw cutter patented in July, 1834, vol. xv., p. 96. We might allude to others, both of a prior and a subsequent date, which contain the same "arrangement of the machinery in general."

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45. For an improvement in the construction of *Water Cisterns;* Levi Kidder, city of New York, January 21.

The specification of this patent is made with all due attention to form, but this will not communicate value to that which is not intrinsically good, and such, we think, is the case with the invention before us. Where a cistern is to be made, we are directed to dig out an opening therefor in the ground, somewhat larger than it is designed eventually to be, say two feet in the horizontal dimensions. A mould of wood is then to be made of the intended size of the cis-

tern; this should be formed in sections, so that it can eventually be removed; it may be in the form of a jar, lessening at top. The earth taken out is then to be sifted, puddled, and pounded, and closely packed in all round the mould, adding clay or lime at discretion. This is to stand a sufficient length of time to become hard and firm; the mould is then to be removed, and the inside plastered with hydraulic cement.

The patentee does not claim the plastering with cement upon the earthy walls, or the use of gravel to harden the mortar. "But the claim of this applicant in respect to the construction of such vessels, consists, as aforesaid, in the mode or method above described, of forming vessels intended to be constructed to hold water, or other fluid, as aforesaid." Which claim falls very short of distinguishing the plan of the patentee from that of others.

Where the earth is compact, a better cistern would be made by merely excavating and plastering, and, in any situation, a wall of brick, well lined with cement, would be far better than one of earth, and it would be quite as cheap as that proposed.

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47. For machinery for the purpose of *Manufacturing Barrels;* John Squier, Selina, Onondaga county, New York, January 21.

This patent is taken for a system of machinery for manufacturing staves for dry barrels, such as flour, salt, lime, and plaster barrels. A large part of the operation is to be performed by means of circular saws, the mode of fixing and using which is described. The machine is said to consist of four principal parts, each of which is shown in the drawing, and referred to in the specification. Not a word is said respecting what the patentee considers as invented by him; he therefore patents the whole, and the originality of every part is certainly a very doubtful thing.

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48. For a *Press for Cotton, Hay, &c.;* Ebenezer Eliason, Jr., Fredericksburg, Spottsylvania county, Virginia, January 21.

This is a horizontal rack and pinion press, to be worked by horse power. The packing is to be effected at each end of the horizontal box, or frame, which is of suitable size for the bale to be formed. A vertical shaft rises from the centre of the box, and has a sweep on its upper end, to which to attach the horse; on the lower end of this shaft there is an endless screw, that turns a wheel on a horizontal shaft crossing the box; a pinion on this shaft mashes into a rack, which lies along the axis of the box, and has a follower upon each of its ends. Its construction and operation will now be understood, as there is not any novelty in the box itself. The claim is not well made out, being to "the manner of gaining power applied to pressing," and to "the manner of confining the screw between two cross pieces."

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49. For making *Truss Hoops;* Tristram Burgess, and Simeon Burgess, Livonia, Livingston county, New York, January 21.

This machine bears some resemblance to that noticed at No. 41, and is for a similar purpose. The hoop is, in like manner, to be bent round a cylinder, and, whilst bending, is to be pressed upon by a roller. It is not well described, the drawing is extremely imperfect, and there is not any thing claimed.

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53. For a *Fireplace;* Ansel Gerrish, Strapleigh, York county, Maine, January 23.

We are not quite certain that we have a correct conception of what the patentee intends to describe as his contrivance, although we have before us a drawing and description, with a claim attached to them; but the model is principally referred to, instead of the drawing. We think, however, that what is accounted the essence of the invention, is a flat funnel, pipe, or chimney of metal, to be used instead of the ordinary chimney, extending up from the throat of the fireplace. It is averred by the patentee, that he saves one-half of the fuel ordinarily employed, and accomplishes many other desirable ends. The insertion of his claim would throw but little light upon the subject.

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51. For *Separating Garlic and Smut from Grain;* Abraham Hurst, Allen township, Cumberland county, Pennsylvania, January 23.

This machine contains a series of riddles, cylinders, inclined planes, and a revolving fan, much like those used in other machines. One of the cylinders is to be covered with card teeth, and has a concave similarly furnished. We see but little of novelty in the parts represented and claimed, and nothing calculated to separate the garlic more effectually than it is at present done, which, unfortunately, is but imperfectly.

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52. For a *Thrashing Machine;* Alexander Porter, New Vineyard, Somerset county, Maine, January 23.

The claim is to "the wedge form and graduated projections of the teeth; and the cleaner is formed of long teeth, constituting a screen, or sieve, by one comb gradually projecting beyond the other." This is all we think it necessary to give.

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53. For a *Stove for Burning Anthracite;* Jacob J. Janeway, New Brunswick, New Jersey, January 27.

This stove does not differ, in appearance, from others which have preceded it, as it is represented in the drawing, which shows nothing more than its exterior, and is without written references; for its interior construction, we have, therefore, to depend solely on the description; a section certainly ought to have been furnished. The base of the stove is a square pedestal, forming the ash pit, as usual; this is surmounted by a cylinder, with its door for supplying fuel to the furnace part; a smaller cylinder succeeds to this, and then a third, still smaller, from which passes the smoke pipe. In the upper cy-

linder, and also in the stove pipe, there are valves, or dampers. In each of the lower cylinders, there are perforations to let out heated air.

"On the grate in the first cylinder are placed fire bricks, to secure the burning of the coal; on the bricks is set a cast-iron cylinder, of less diameter than the outer cylinder, surmounted by a segment of a cone of the same material, the opening of which is surrounded with an iron plate, that fills up the space between the opening and the external iron. In this manner a chamber is formed, from which, through apertures made for the purpose in the outer cylinder, heated air is let out into the hall, or entry."

"The inventor claims the construction of the chamber above described by the fire brick, the cast-iron cylinders, the segment of a cone of the same material, the iron plate that surrounds its mouth, and the external cylinders with apertures to let out the heated air. He claims, also, the application of a valve in the third section, or cylinder, of the stove."

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54. For an improvement in *Setting Awl Blades, &c.;* Erastus B. Bigelow, and Stephen P. Bringham, West Boylston, Worcester county, Massachusetts, January 27.

The awl, or other instrument, is to be inserted into a split socket, to which is adapted a ferule, by the sliding of which on to a conical swell at the end of the socket, the shank is held fast. The apparatus is well contrived for the purpose, but we apprehend that its complexity will render it too expensive for common use; we shall not attempt to describe the respective parts employed, which consist of five pieces of metal. There is no claim made, which must be considered as a defect, for although there is sufficient novelty in the general plan upon which to have founded one, the whole is not new; split sockets, for example, have been before used; still we think it probable that upon the general plan, the patent might be sustained.

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55. For a *Rotary Pump;* William C. Trowbridge, South East, Putnam county, New York, January 27.

Like the rotary pumps which have preceded it, this also is destined to an early oblivion, as the defects inherent to most of the plans of such machines, are not removed in this. The accurate fitting of the parts requires excellent workmanship, and the good effeect of this is soon destroyed by their wearing. The chamber of this pump is to be a hollow drum, or shallow cylinder, within which a wheel is to revolve; this wheel is to be scolloped out, leaving its periphery in contact with the interior periphery of the drum at four points, ninety degrees apart. The scolloped spaces between these form the chamber to receive the water. The drum is to stand vertically, and a supply pipe, furnished with a valve, leads from its lower edge to the reservoir. At the distance of one-fourth of the circumference from this, is the discharge pipe. There are certain provisions made, the description of which we omit, as we have given a general view of its construction, and think more unnecessary.

The things claimed are, the construction of the wheel; a valve, or break, used to direct the water into the discharge spout; and a cock in the supply pipe to let off the water.

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56. For *Paddles for Propelling Boats;* Philip E. Barbour, Louisville, Jefferson county, Kentucky, January 27.

This contrivance is, in effect, similar to several others which have been essayed both here and in Europe, but which have not, and are not soon, likely to supersede the paddle wheel. On each side of the boat there are to be two double cranks, the shafts of which are in the same plane, and these cranks in their revolution carry two horizontal bars, parallel to each other, each bar having bolted to it two or more paddles, which are caused to dip vertically in the water. The claim made is to "the application of these cranks, with their connecting bars and paddles, by a horizontal motion, to give a perpendicular dip to said paddles."

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57. For a *Mill for Grinding Grain*, called the "Farmer's Mill;" John R. Sleeper, city of Philadelphia, January 27.

(See specification.)

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a Patent for a Stove for Cooking with Anthracite Coal, called the Salamander Cooking Stove. Granted to ABRAHAM D. SPOOR, *Coxsackie, Greene county, New York, January 7th,* 1835.

Whereas, the want of sufficient flame, and the limited extent of the horizontal surface of the fire, in stoves for cooking with anthracite coal, hitherto in use, have made it difficult, if not impossible, to expose more than one or two boilers at once to the degree of heat necessary to carry on culinary operations to advantage; and whereas, it has been found difficult, also, in such stoves, to increase or diminish the fire suddenly for culinary processes: Therefore, be it known, that I, Abraham D. Spoor, have invented a new and useful improvement in stoves for cooking with anthracite coal, called the SALAMANDER COOKING STOVE, by which it is intended to obviate the above difficulties, and of which the following is a true and exact description.

The circular form, though not essential, being the best adapted to the arrangement that is to be made of the boilers, and other utensils for cooking, is the one that will now be described.

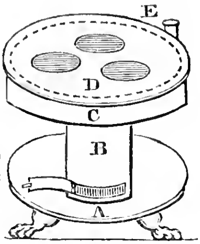
This stove consists of a hollow cast-iron cylinder, of from twelve to fifteen inches in height, placed vertically on a circular hearth of about double its diameter, both having a common centre. The grate is suspended within this cylinder, about midway between the base and top, and it may be adjusted for rest or motion; and the part

above the grate may be lined with brick, stone, or other non-conductor of heat. The ash drawer may be above or below the hearth, and should entirely close the entrance for air at the base of the cylinder. On the top of this cylinder is placed another hollow and concentric cylinder, of double the diameter of the lower one, or larger if required; this may be about six inches in height, and the lower plate of the upper cylinder has an opening in its centre, equal in extent to the top of the lower cylinder; and at the margin of this opening the two cylinders are joined together, and united into one common chamber. The upper plate of the upper cylinder, or the top plate of the stove, has several openings for boilers and kettles, and other cooking utensils, the openings for them being in such order and arrangement, that all of them, to the number of three or more, stand partly over, and are directly exposed to, the fire, and may, consequently, be kept boiling at the same time, thus avoiding the necessity of removing one after the other successively to the fire, or of giving a rotary motion to the plate in which they are contained, to attain the necessary degree of heat. For increasing the heat under either of the boilers, a further provision is made, by means of a flue within the periphery of the upper cylinder, to extend from the opening for the pipe both ways, so as nearly to meet in front, and encircle the stove; lateral outlets are made into this flue, opposite to each boiler, which outlets, or openings, are provided with dampers, to shut or open them as occasion requires. The opening, with a collar for the attachment of the pipe, may be on the outside of the periphery of the upper cylinder, and there should always be a damper in the pipe to regulate the fire. The baking, roasting, and other similar operations, are performed in separate bakers and roasters, of suitable construction, placed at proper distances around the lower cylinder of the furnace.

I claim as my invention and improvement, the drum, or upper cylinder, with the openings for boilers in the top, so placed in relation to the lower cylinder, or furnace, that all the boilers, to the number of three or more, shall be partly over, and directly exposed to, the fire, and so as to be kept at the required temperature at the same time; and also the circular flue, with lateral openings and dampers for directing the draught under either of the boilers when required, whether said flue be constructed within, or on the outside of, the upper cylinder; and the general arrangement and combination of the respective parts, so as to constitute a cooking stove, operating upon the principle, and in the manner, described.

A. D. SPOOR.

Spoor's Salamander Cooking Stove.



A, Circular hearth.
B, Furnace cylinder.
C, Upper cylinder, or drum.
D, Top plate, with openings.
E, Pipe.

The dotted lines show the place of the partition, with dampers, forming the curved flue within the upper cylinder.

Specification of improvements made for equalizing the heat in, and correcting the smell from, Cook Stoves, and for improving the quality and flavor of articles cooked therein, especially where anthracite coal is the fuel in use. Granted to Eliphalet Nott, *Schenectady, New York, January 7th,* 1835.

Whereas, in cook stoves, having ovens constructed of iron plates, through which the heat is transmitted from the flame in passing along and around the same, the heat is variable, the smell offensive, and the quality and flavour of the articles cooked, injured: therefore, an improvement has been introduced, which consists—

In substituting ovens, the crust of which, so far as the same is exposed to the action of the interior furnace, or flue, but especially the furnace, is constructed, in whole or in part, of brick, stone, or other material, that is a poor conductor; and so far as the same is exposed to the action of the exterior air, is constructed of tin, polished brass, or other material, that is a good reflector; and also in opening an aperture for the escape of steam to the flue in ovens heated laterally.

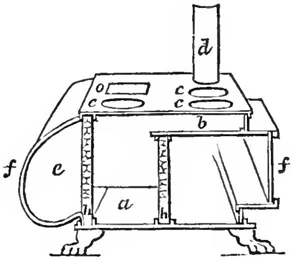
The form and relative positions of which furnace, flue, and ovens, may be varied at pleasure, provided only the whole be so combined, that the heat from the furnace and flue be transmitted to the oven, through brick, or stone, &c., on the inside, and reflected from tin, polished brass, &c., on the outside. For further information, reference may be had to the explanations and drawings connected herewith.

Summary.—The invention and improvement herein contemplated, consist in equalizing the heat, correcting the smell, and improving the quality and flavor of articles cooked in stoves, by so constructing and combining the furnace, flue, and ovens, that the heat shall be transmitted from the former to the latter through brick, or stone, &c. on the inner side, and reflected from tin, polished brass, or other reflector, on the outer side, in place of being, as heretofore, transmitted through, and reflected from, iron.

I, therefore, claim as my invention and improvement, the construc-

tion and combination of the furnace, flue, and oven, whether fixed or movable, in a cook stove, especially where anthracite coal is the fuel in use, in the manner, and for the purposes, above set forth, together with the uses to which the same has been, or may hereafter be, applied.

ELIPHALET NOTT.



a, chamber of combustion.
b, flue for flame.
c c c, kettles in places.
d, smoke pipe.
e e, ovens.
f f, exterior tin crust of ovens.
g g, exterior brick crust.
h h, interior iron crust.
o, inlet for fuel.

Specification of a Patent for a Mode of Heating Reverberatory or Puddling Furnaces, with Anthracite Coal. Granted to M. BROOKE BUCKLEY, *of Pottsville, Schuylkill county, Pennsylvania, January* 16*th*, 1835.

The common and only mode now in use of heating reverberatory or puddling furnaces, is by the flame of bituminous coal created by the draught of high stacks, or chimneys. The coal is placed upon a grate, and the air passing freely under it is sufficient for the use of bituminous coal; in my discovery, or invention, I use the anthracite coal placed in a cylinder, or chamber, the size of which must be in proportion to the size of the furnace; for common uses, two feet in diameter by three feet high is sufficient, but it may be made of any convenient size or shape to suit the furnace. I substitute a blast created by a common blowing apparatus, and applied to the coal contained in the cylinder, or chamber, which is made of fire clay, or brick, or of any suitable fire-proof material. The blast is introduced by a pipe at or near the bottom of the chamber, and thereby expels a powerful flame, which passes into the furnace, and creates the necessary heat for all the variety of ores for which the reverberatory furnace is now, or may be, used.

The impurities of the coal are passed off in a fluid state through a cinder hole near the bottom of the coal chamber, and the fire is kept free and open by the blast.

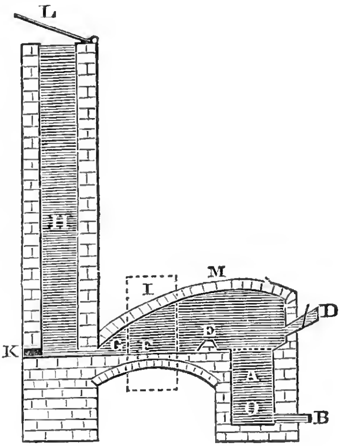
The use of the anthracite coal is much more economical, and more certain in its operation, than the bituminous, and will produce an immense saving in the process of refining and manufacturing iron, which will go far towards placing the United States upon an equality with Europe in that species of manufacture.

What I claim as my invention and improvement, is the introduction or application of anthracite coal to the reverberatory or puddling furnace, by means of blast, to expel the flame and heat therefrom, instead of the draught created by the high stack, or chimney, now in use for the bituminous coal.

The accompanying drawing represents the furnace, with my invention and improvement, as constructed of common brick, lined with fire brick, arched, and bound together with cast-iron plates and bars.

M. BROOKE BUCKLEY.

A, the circular chamber containing the coal.
B, the blast hole.
O, the cinder hole in the chamber.
D, the stack hole for introducing coal.
E, the bridge of the furnace.
F, the bottom where the material to be acted upon is placed.
G, the throat.
H, the stack.
I, the door represented by dotted lines.
K, the cinder hole of the furnace.
L, the damper, to be suspended by a lever.
M, the roof, or arch.



Specification of a Patent for an improved Mill, for Grinding Corn, Malt, &c., called the "Farmers' Mill." Granted to JOHN R. SLEEPER, *city of Philadelphia, January 27th,* 1835.

A frame sufficiently strong, and of any suitable materials, is made, between, or upon, the timbers of which three or more rollers of iron, or any other suitable material, are confined, and made to revolve in such a way that the grain, &c. may pass between each set of rollers. The plan best adapted to that purpose, will be to make one roller as much larger as will admit two or more small rollers to revolve in opposite directions, and with different velocities on one side of it, (something in the manner of a carding machine,) in such a way that the grain, &c. passing between or under the first roller, may, by its gravity, pass under the next roller in succession, and so on as many as may be found necessary to accomplish the desired purpose, which for Indian-corn, barley, &c., three rollers have been found sufficient. For flour, probably four, or more, will be found necessary. Adjusting

screws, wedges, &c., will be found necessary, in order to set the rollers to grind fine and coarse.

What I claim as my invention, discovery, or improvement, and not previously known in the above described mill, or machine, is, applying more than two rollers, and running them at different velocities, thus adapting them to the principle of grinding grain, coffee, &c., which otherwise cannot be accomplished.

JOHN R. SLEEPER.

ENGLISH PATENTS.

¶ *Specification of the Patent granted to* JOHN HENRY CASSELL, *for a Cement, or Combination of Materials, applicable to the different purposes for which Cement, Stone, Brick, or other similar substances, may or can be used. Sealed April* 19, 1834.

To all to whom these presents shall come, &c.:—Now know ye, that in compliance with the said proviso, I, the said John Henry Cassell, do hereby declare that the nature of my invention, and the manner in which the same is to be performed, are fully described and ascertained in and by the following description thereof, (that is to say:)

My invention consists in cementing and combining the materials for road making, and for constructing docks, water-courses, foundations, and such like works, by the aid of coal, or other mineral tar, wood tar, and resinous matters, or the products of tar, in the manner hereafter described, and thus producing a concrete mass, which may be formed or moulded into the desired figure, which, when cold, will be exceedingly hard, and be suitable for the purposes of cement, stone, or brick, in constructing such works as before mentioned. But, in order that my invention may be fully understood, and carried into effect, I will describe the methods I pursue for combining such materials together, and applying them to the purposes aforesaid. I take a quantity of tar, such as is produced by the distillation of coal, shale, or wood, and by further distillation, I separate the aqueous part therefrom, and thus reduce the tar or resinous substance to the consistency of treacle, and this I call the first product, the tar, or resinous substance, being in a thick and adhesive condition when cold. In order to produce the second product, I carry on the distillation still further, and by this means I obtain the essential oil; and for the third product, I carry on the process of distillation till the substance becomes so adhesive, that, a small portion being removed from the still, will draw out into threads, and, when cold, becomes brittle; this will soon be judged of by practice; and for the fourth product, I carry on the distillation still further, till the substance becomes extremely hard, and which will not soften by the heat of the sun. The apparatus, or still, which I use for this purpose, is similar to what is called a pitch still, which is well known, and forms no part of my invention, nor does the process of distilla-

tion for separating the tar into three products, that is to say: First, tar deprived of the aqueous parts, and reduced to a thick and adhesive condition when cold. Secondly, the essential oil. Thirdly, the adhesive tar, (or product thereof,) which, when cold, is hard: and, fourthly, the substance not acted on by the heat of the sun. It will be desirable here to remark, that I prefer coal tar, in consequence of the low cost at which it can be obtained.

I will now proceed to describe the combining of these products with other materials, in forming a cement, or combination, in the making of roads, docks, water-courses, and such like works. I will first describe the method I pursue in applying my invention to the making of roads, and in repairing them. Having laid out the road, and made the necessary drains for preventing the lodgment of water below the road, I prepare the surface by beating, or rolling, in order to compress the earth, particularly when such surface is composed of loose earth, and, by raking, bring the surface to the figure desired, that is, with such slopes as I have determined on, and make the same as even as possible. I then saturate such surface with the essential oil, (the second product) in thin layers, allowing time to subside. The oil thus laid on will quickly penetrate the earth. I then proceed with the second operation, which consists of laying over the surface of the earth so prepared, a thin coating of the first product, say one-fourth of an inch thick, and set fire to the same, and permit it to burn a few seconds. Dry sand, or fine dry earth, or slag, or cinder, or a combination of these, are to be sifted on the tar and oil, to the depth of about half an inch, which will put out the flame. I then beat or roll the same, in order to blend or cement them together, and, in order to facilitate the operation, I find it desirable to have a frame of iron, or other material, about three feet square, which I successively place over the surface of the road, and thus complete portions of the surface at each operation. By this means, it will be evident that I produce a thin cemented layer, or surface, on the road. In some instances I make one, two, or more, layers of this description on the road, depending on the extent of traffic to which it is to be subjected; but it will be desirable to remark, that I only use the essential oil previous to the first layer. Having thus prepared the under surface of the road, I proceed to finish the same, and the finishing materially depends on the description of materials which may readily be obtained where the road is making, broken granite, or flint, or slag, or gravel, or hard material suitable for the surface of a road; and I mean, in the present instance, that the same should be broken somewhat small, say not larger than three inches, and I take, by weight, one of the third product to two of sand, and boil and mix them well together; I lay over such broken materials to the desired depth, and then pour in such sand and third product, which, running into the space between the stones, forms a solid mass when cold. When the said fourth product is in a melted state, I mix, in an open vessel, any of the materials, sand, stone, &c., in the proportion of one of the fourth product to three of the stone, sand, &c., by weight, and combine them well together, and when so combined, I lay them over the surface of

the road, from one to four inches, or more, if desired, the road being prepared as before described; this is to be beaten down, and as even a surface as possible produced, by which means a hard surface will be formed, and will wear exceedingly well, and produce a cheap and lasting road. Or, where it is desired that the upper surface should be formed of larger stones, or other material, such as broken granite, flints, slag, or other substances, of a size such as is used in making what are called Macadamized roads, or larger, I have frames, or moulds, from twelve to forty-eight inches square, open at top and bottom like a brick mould, and pack in a number of such broken pieces of material, and then run in a quantity of the fourth product in a melted state, and thus fill up the interstices between the stones or other materials; and, making the upper surfaces as even as possible, these materials are left in the moulds till they are cold; they will then be strongly cemented together, and be ready to form the upper surface, or road, and they are to be put on in the following manner: having prepared the road, as above described, by the essential oil, and the first product, and the sand, or fine earth, or other material, I lay over a coat, say one inch, of the third product of the tar, then cover the surface, whilst the third product is hot, with the moulded materials, placing that part which was uppermost in the act of moulding, on the surface of the road prepared as above, and, by beating or pressing, cause the moulded parts to adhere firmly; by this means, a rather rough surface for the tread of a horse will be produced to the road. I also use the first preparation to cover good Macadamized, or other, roads, which firmly cements every stone into its place, prevents the wheels from ploughing the roads, the water from softening the sub-strata, and preventing mud and dust from rising. I also use the third preparation of tar, when in a melted state, to pour between the joints of street pavements, in the manner that grouting is now performed; this will cement every stone together, and prevent the water from getting to the sub-soil, or rising therefrom, which causes the present pavement to sink in different parts. If the street is required to be very durable, or the sub-strata is of a soft substance, I first prepare the ground as described in the first process; I then saturate the paving stones with essential oil, and run the third product between the joints of the stones, or bricks, that are required for foundations; I saturate with essential oil, and set them with the third product. The resin of wood I use for making stone and cast figures, that are required to be of a yellow colour; I add sand of the required colour, as in the fourth process. In some instances, in place of moulding such larger pieces of stone, or other material, I mix sand, or fine earth, or other material, with the fourth product, when in a hot and melted state, and mould the same as above described, such materials being very suitable for foot-paths, water cisterns, pipes, and a variety of other useful purposes.

Having thus described the nature of my invention, as applied to roads, I will proceed to describe its application to canals, docks, water courses, and such like works. Having excavated the earth, and made the slopes of the banks to the intended figure, I proceed to

beat the surface of the earth; in order to render the same as compact as possible, I saturate it with the essential oil, as before described; then lay over a thin coat of the first product of the tar, and set fire to the same; then sift over sand, or other dry earth, or material, as above described. Three layers of these cemented materials, when applied to the usual slopes for canals and water courses, will be sufficient, and will offer a compact and close surface to the water, which will protect the banks from the prejudicial washing thereof, and, consequently, be of great utility when quick transit is desired, or when the canal boats are propelled by machinery. In forming the embankments of docks or quays requiring steep or perpendicular walls, a much stronger facing is required, depending on the depth of the water they are to sustain, and also the description of ground behind; and I usually construct a framing of wood to the desired thickness, and having previously made a good base or foundation of a combination of the fourth product of the tar and broken stones, or other rough, hard materials, and sand, or earth, I continue melting and mixing quantities of the said fourth product of tar, and broken stones, and sand, in the proportions of about one of the fourth product to three of the stones and sand, or other material, and successively throw them into the frame, and level and beat such concrete mixture till the frame is full to the surface of the intended finish of the wall, which I usually make to lay on the surface of the earth. I would here remark, that between each quantity of the material thus put into the frame, I find it desirable to lay over a thin coat of the first product of the tar, and light the same, in order that the surface of the last quantity should be in a melted state, to receive the next quantity of the materials. It will be evident from the above description, that piles, and also land ties, may be built in the walls, in order to give additional strength to them; and I would remark that, where frames, or moulds, are used, I wash the same over with a covering of whitewash, or of clay, by which means the moulds, or frames, separate readily from the substances.

Having thus described the nature of my invention, and the manner of carrying the same into effect, I would have it understood that I lay no claim to any of the materials separately; and it will be evident that the means of carrying the same into effect, may be varied to suit the particular object to which the invention is to be applied; but I would have it understood that what I claim as my invention, is, the cementing or combining the materials for making and mending roads, and for constructing docks, water courses, water tanks, pipes, and such like works, by the aid of tar and resinous substances, or the products thereof, as above described.

Specification of the Patent granted to John B. C. Torassa, Paul I. Muston, *and* Henry W. Wood, *for certain improvements in Making or Producing the Pigment commonly known by the name of White Lead, or Carbonate of Lead. Sealed December* 11, 1833.

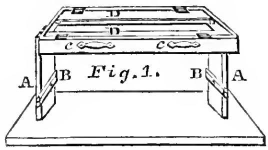
To all to whom these presents shall come, &c. &c.: Now know ye, that in compliance with the said proviso, we, the said John B. C. Torassa, Paul I. Muston, and Henry W. Wood, do hereby declare the nature of the said invention to consist in making or producing the pigment commonly known by the name of white lead, without the use or employment of vinegar, or acetic, or acetous, acid, in any other form, or under any other name, and without the aid of artificial heat, except for the purpose of drying the white lead, as hereinafter mentioned, by reducing the ordinary lead of commerce, by friction in water, to a very fine powder, and then exposing the said powder to atmospheric air, so that it may acquire both oxygen and carbonic acid, and thus be converted into the pigment aforesaid. And in further compliance with the said proviso, we, the said John B. C. Torassa, Paul I. Muston, and Henry W. Wood, do hereby describe the manner in which the said invention is to be performed, by the following statement thereof, reference being had to the drawings annexed, and to the figures and letters marked thereon, (that is to say:)

We cut common sheet lead into very small pieces, or grains, or, what is preferable, we form lead into what may be termed shot, in the same manner as patent shot is made, except that no other ingredient is used to cause the lead to cool in a perfectly round form. The exact shape of the pieces of lead is immaterial, but the shape of shot is the most convenient. These shots, or pieces of lead, should be about the size of *duck shot*, and having procured any given quantity, we place them in an open, shallow, wooden vessel, lined with sheet lead, which we call a friction vessel, covering the bottom of the vessel with the shot, or pieces of lead, to the depth of about one inch, and then add water sufficient to cover them, but not more. We then tip the vessel containing the shot, or pieces of lead, from side to side, in such manner as to cause the shots, or pieces of lead, to roll backwards and forwards on the bottom of the vessel, and thus produce great friction of the pieces of lead one against the other, and this friction will produce an extremely fine powder of lead mixed with the water, from which it will separate easily, if left to subside. We then remove the moist powder, which is, at an early period of the process, of a dark colour; pass it through a fine sieve, and expose it for about eight or ten days to atmospheric air, whilst the powder is still in a moist state, and about the consistence of thick cream, in another shallow, open vessel, which we call the carbonating vessel, where we agitate or stir it constantly, in order to expose it as much as possible to the action of the atmospheric air, until it assumes a beautiful white colour, and is thus converted into the pigment com-

monly known by the name of white lead, or carbonate of lead. The carbonating vessel may be made of any convenient material, but we prefer wood as nearly colourless as possible. When the white lead is thus produced, if it should still contain any moisture, it should be well dried before it is put into casks for sale.

Description of the Drawings.

Fig. 1 is a perspective elevation of a friction vessel, such as we prefer for the purposes of the said invention; it consists of a shallow box, or tray, lined with sheet lead, turning on a shaft, or axis, passing under it, which rests at each end in a slot formed in an upright standard, as shown at A A; to these standards are fixed cross pieces, B B, which serve as stops to prevent the tray from ever tipping, or dipping beyond an angle of forty-five degrees. C C are two handles, by which the front of the tray is moved up and down by the operator, the tray turning on its axis, as here shown. D D are two flaps, or wash boards, to keep the shot, or pieces of lead, and the water, from spilling over when the tray is in action.



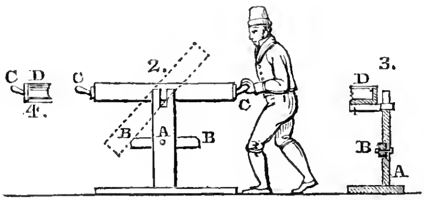
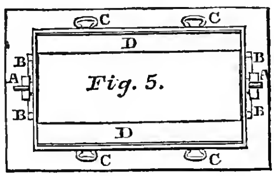


Fig. 2 is a side elevation of the same vessel, showing how the operator stands to work it. The dotted lines show the greatest angle at which the tray can be placed; and as similar letters are used to denote similar parts in all the figures of the drawing, no further description of this figure will be necessary.

Figs. 3 and 4 are sections of parts of fig. 2, fig. 3 being taken longitudinally, and fig. 4 transversely.

Fig. 5 is a plan of the friction vessel. Of the carbonating vessel, it is only necessary to say that a tub, or any other open and rather shallow, wooden vessel, will answer the purpose.



Now whereas, we do not claim as the said invention, the form of the friction or carbonating vessels here given, or the particular manner hereinbefore described of agitating the lead, though the foregoing is the process we usually employ, as being the best adapted of any we now know of

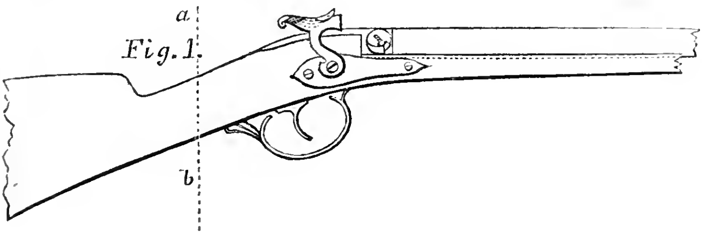
for the purpose, when engine power is not used; but we claim as the said invention, the following improvements, (that is to say,) making white lead without the use of vinegar, or acetic, or acetous, acid, in any other form, or under any other name, and without the aid of artificial heat, except for the purposes of drying the white lead, as hereinbefore mentioned, and converting the ordinary lead of commerce into the pigment commonly known by the name of white lead, or carbonate of lead, by reducing it to a fine powder by friction, as aforesaid, and then converting that powder into the said pigment, by exposing it to the action of the atmosphere, as hereinbefore described. And such invention being, to the best of our knowledge and belief, entirely new, and never before used, we do hereby declare this to be our specification of the same, and that we do verily believe this our said specification doth comply, in all respects, fully, and without reserve or disguise, with the proviso in the said hereinbefore in part recited letters patent contained; wherefore we do hereby claim to maintain exclusive right and privilege to the said invention.

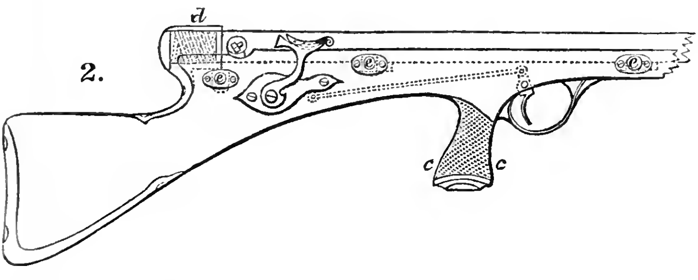
[*Rep. Pat. Inv.*

Specification of the Patent granted to WILLIAM S. GILLETT, *for certain improvements in Guns, and other Small Arms. Sealed February* 8, 1834.

To all to whom these presents shall come, &c. &c.: Now know ye, that in compliance with the said proviso, I, the said William S. Gillett, do hereby declare the nature of my invention, and the manner in which the same is to be performed and carried into effect, are fully described and ascertained in and by the following description thereof, reference being had to the drawing hereunto annexed, and to the figures and letters marked, (that is to say,) according to the ordinary construction of fowling pieces, muskets, rifles, pistols, and such like small arms; the hand which holds, and also fires, the gun or pistol, is placed (with the exception of the finger which pulls the trigger) at, or behind, the breech of the gun or pistol. It consequently follows, when the barrel is long and heavy, it becomes desirable to increase the weight of the stock, in order to make the centre of gravity of the gun or pistol come as near as possible to the place where the hand (which fires) holds the gun or pistol, in order to facilitate, as much as possible, the raising the gun, to bring it to point in the direction required. Where the stock is not weighted for the purpose of bringing the centre of gravity of the gun to the point where the firing hand holds the gun, (that is, at or about the breech of the barrel,) the weight of the barrel, particularly in heavy guns or pistols, requires considerable exertion in supporting them in the act of pointing, when about to fire. By the words, the "*hand which fires*," I mean, under ordinary circumstances, the right hand, in contradistinction to the hand which only acts as a rest, and usually the left hand. And it will be desirable here to remark, that, by weighting the stock, as before mentioned, although it assists and facilitates the act of pointing, it nevertheless materially adds to the fatigue of carriage.

Now, the object of my invention is to construct or mount the barrels of rifles, muskets, fowling pieces, and other such like guns and small arms, in such manner that the hand which holds and also fires the gun, or other small arms, is placed considerably forward of the breech, and approaches as nearly as possible to the centre of gravity of the barrel; the stock, or butt, of the gun projecting only a short distance from the end of the barrel, and, consequently, not materially operating to vary the centre of gravity of the whole gun, from the centre of gravity of the barrel, whereby I am enabled to produce guns, and other small arms, having a given length and strength of barrels much lighter, and more capable of being handled, than when mounted in the ordinary manner, and at the same time a gun, or other small arm, when mounted or stocked according to my invention, will, for a given length of barrel, be much shorter than when mounted or stocked as heretofore, and by this means a gun of greater power, though but of equal weight with an ordinary fowling piece, musket, or rifle, may be fired with much greater facility, at the same time it may be held with more firmness and steadiness, whilst any oscillation caused by a slight involuntary movement of the hands, arm, or body, (owing to the holding being considerably along the barrel,) will not so materially affect the pointing, as when the hand which holds and fires is placed at a greater distance from the muzzle of the gun, that is, at or behind the breech, as heretofore practised.





Secondly, my invention consists in applying a spring, as hereafter described for the purpose of permitting a longitudinal movement to the barrel.

In order that my invention may be most fully understood, I will now describe the drawing hereunto annexed.

Description of the Drawing.

Fig. 1 represents the outline of an ordinary gun, or fowling piece, which I have drawn in order the more clearly to point out the object of my invention. The line, *a b*, is the point at which the hand which fires grasps the stock, whilst the other hand is carried forward as a rest for the barrel.

Fig. 2 represents a gun mounted, or stocked, according to my invention. In this figure, it will be seen that there is a projecting handle, *c*, considerably forward of the breech, and intended to be, as nearly as possible, at the centre of gravity of the barrel. This handle, *c*, is grasped by the hand which fires the gun, the trigger being in front of the handle, *c*, there being a connecting rod attached to the trigger, which connects it with the lock, as is shown by dotted lines; the lock being of any ordinary construction, but in this instance its action is reversed, the cock striking in an opposite direction to that which is usual, and this is with a view to allow of the barrel having a movement lengthwise, there being a coiled spring contained in the socket, *d*, into which the breech of the barrel enters and slides when there is a strong recoil, the slits through which the pins, *e*, pass, allowing of such a movement, as is shown by dotted lines in fig. 2; but I only recommend such an application of a spring to guns firing ball, as muskets and rifles.

I have not thought it necessary to show a drawing of a musket or rifle, as the manner of stocking, or mounting, such fire-arms, according to my invention, will be readily performed by a workman engaged in this part of the business; nor have I thought it necessary to show a drawing of the mounting of a pistol, stocked or mounted according to my invention; I would therefore remark, that there will be no butt like those to ordinary pistols; on the contrary, the stock will only proceed to the breech of the pistol, the holding part, or handle, *c*, being formed at, or near, the centre of gravity of the barrel, in like manner to the guns above described.

Having now described the nature of my invention, and the manner of carrying the same into effect, I would have it understood, that I lay no claim to any of the parts of a gun or pistol, which are well known and in use; but what I claim as my invention, is the mounting or stocking of guns, or other small arms, in such manner that the hand which fires, holds and supports the gun at or near the centre of gravity of the barrel, and, consequently, considerably forward of the breech thereof, as above described. Secondly, I claim the application of a spring, as above described, for the purpose of allowing a longitudinal movement to the barrel.

[*Ibid.*

Translations from Foreign Journals.

On the Cementation of Iron by Means of Carburetted Hydrogen. By M. Dufrenoy, *Chief Engineer of Mines.*

[Translated for this Journal, by Edward Poole.*]

Mr. Macintosh, one of the best informed mechanics in England, and to whom the chemical works in the neighbourhood of Glasgow are indebted for many improvements, conceived the idea of making steel of cementation, by exposing iron to a current of carburetted hydrogen gas. The apparatus which, after various trials, he found most convenient, consisted of a tube of cast-iron, coated inside with stiff clay, the same that is used in the construction of the furnaces on the Clyde. In order to prevent the usual contraction of clay, it is mixed with about a third of the same clay, baked, and afterwards reduced to a sufficiently fine powder. The tubes used by Mr. Macintosh, vary in length from five to six feet, the internal breadth from ten to eleven inches. The lining of clay is two inches thick; it should be well beaten, and have no fissures. To effect this, a cylinder of wood, rather less in diameter than the bore of the apparatus, is introduced, and the clay is then placed by small successive layers, as is practised in making pots for glass factories.

The tube has pipes at each end, one serving for the introduction of the carburetted hydrogen, while the gas escapes by the other; both these pipes are exactly closed, so that the carburetted hydrogen may remain in the tube as long as it is judged proper.

This tube is placed in a furnace, disposed in such a manner that it may be surrounded on all sides by charcoal.

Each tube is filled with from a hundred to a hundred and fifty pounds of iron; the bars are placed lengthways in the tube, taking care to keep them apart, and to separate every layer by small bars placed crossways, so that the hydrogen gas may be in contact with their whole surface. After the fire is lighted, and when the tube is sufficiently heated, a current of carburetted hydrogen gas, produced by the distillation of coal, is passed through. But, in order that the gas and the iron may acquire the proper temperature for cementation, the hydrogen is removed only every half hour. At the end of this time, the hydrogen gas is, in a great measure, deprived of the carbon it contained, and, on escaping from the tube, burns with a feeble light.

The time necessary for cementation depends upon the dimension of the iron bars to be cemented, and upon the temperature to which the apparatus is exposed. When the tube of cast-iron is of a reddish brown, and when the bars are two inches broad by six lines thick, only eighteen or twenty hours are requisite to complete the operation; the iron may be overcharged with carbon, with great facility. I have seen thin bars, which were almost in the state of graphite

* At the request of the Committee on Publications.

Proof bars, placed in the disks which close the tube, mark the state of cementation, and the moment when the operation should be stopped.

The steel, when taken from the tube, is covered with small blisters, or bubbles; it entirely resembles steel cemented by the ordinary process. Not having seen the apparatus in operation, I can give no detail as to the manner of conducting the process, neither do I possess any statement as to its economy. Mr. Macintosh, from whom I have received the few particulars that I have just given, is convinced that this process can, with regard to expense, sustain a competition with the ordinary method of cementation; he considers the steel obtained by the hydrogen gas as more homogeneous, and of a superior quality to that produced by the ordinary process. Mr. Macintosh has manufactured many tons of steel, to test the reality of his discovery, for which he has taken out a patent in England.

All the steel made by Mr. M. has been thrown into the market; the greatest part being converted into cast steel, has been used in the fabrication of fine cutlery, and for instruments which require steel of the first quality. [*Annales des Mines*, vol. v.

Report to the Directors of the London and Birmingham Railway Company, accompanied by Experiments on the Transverse Strength, &c. of Malleable Iron, with reference to its use for Railway Bars. By Peter Barlow, *Prof. Royal Mil. Acad., Woolwich.*

(Continued from page 63.)

Preliminary Remarks.

It is only since the very general adoption of railways in this country, that malleable iron has been employed to any extent to resist a transverse strain, and writers who have undertaken experiments to investigate the strength of materials, have hitherto passed over those inquiries which relate to the transverse strength of this metal.* The extraordinary extent, however, to which malleable iron is now applied, to resist transversely a passing load, renders it highly essential that this resistance, and its other properties, should be fully investigated; for it is obvious that every additional weight of metal, beyond that which is requisite for perfect safety, is not only uselessly, but injuriously employed, it being generally admitted that bars beyond

* Some few experiments on the transverse strength of malleable iron have certainly been made. I have given three in my Essay on the Strength of Materials. Mr. Hodgkinson has also glanced at this subject, in his valuable paper of Experiments on Cast-iron,† published in the Memoirs of the Manchester Philosophical Society; and M. Duleau has treated of the subject in his "Essai Theorique et Experimental," &c., but those points of greatest importance connected with the application of this metal to the purposes of railways, have never formed the subject of inquiry.

† Jour. Frank. Inst., vol. ix., pp. 202, 261, 325, 379—vol. x., p 26.

a certain weight cannot be so well manufactured as those of less dimensions; and it is no less certain, that, by a proper disposition of the metal in the sectional area of the bar, (which depends on the data in question,) a greater strength may be obtained with a given weight of iron, than with a greater weight injudiciously disposed. Under these impressions, the following experiments have been undertaken, and to these inquiries only they have been directed; and I am not without hope that on those points they may be found useful.

Before, however, proceeding to these experimental researches, there is one subject, rather of investigation than of experiment, on which I have thought it necessary to bestow some attention, it being one on which the opinions of practical men are much divided; this is, the comparative advantages and disadvantages of what is called the fish-bellied rail, and that with parallel edges.

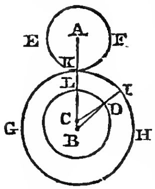
Examination of the Properties, Curvature, and Resistance, of the Fish-bellied Rail.

It is well known, both as a theoretical and mechanical fact, that if a beam be fixed with one end in a wall, or other immovable mass, to bear a weight suspended at the other end, the longitudinal section of such a bar (its breadth being uniform) should be a parabola, because, with that figure, every part of it will be strong in proportion to its strain, and thus one-third of the material may be saved. This form of construction is frequently adopted in the case of cast-iron beams in buildings, and with great advantage, as thereby one-third of the material is saved, while the strength is preserved, and the walls of the building relieved from a great unnecessary weight.

This seems to have led to a somewhat similar principle of construction in what is called the fish-bellied rail, and the question here is, with what advantage? In the first place, it is to be remarked that the figure, which theory requires in this case, is not, as in the preceding, a parabola; for, as in the transit of the locomotive, every part of the bar has, in succession, to bear the weight; and as the strain on any part of a beam supported at each end, and loaded in any part of its length, is as the rectangle of the two parts, the strength being as the square of the depth, it follows that the square of the depth ought to be everywhere proportional to the rectangle of the two parts, which is the known property of a semi-ellipse. The bar, therefore, in theory, ought to be a semi-ellipse, having its length equal to the transverse diameter, and the depth of the beam for its semi-conjugate, and there can be no doubt that such a figure would be, to all intents and purposes, as strong in its ultimate resistance as a rectangular beam.

But it is difficult to obtain this figure correctly in malleable iron, and many of what are called fish-bellied rails, are but bad approximations to it, although others differ from it but slightly. The following is the general mode of manufacture.

E F is the section of an iron roll; G H the section of another.



This latter being hung on a false centre, C, is turned down, leaving a groove of varying depth, as shown in the figure. The cylinder G H being now again placed on its proper centre, B, the bars, are introduced between the two rolls at K L; and as the iron passes through, it acquires the variable depth shown in the lower roll. The inner circle, or bottom of the groove, is generally one foot in diameter, and the upper three feet in circumference; consequently, the figure is completed in a length of three feet, and there are commonly five such lengths in a bar. The computation of the ordinates to the curve thus formed, is by no means difficult; for, calling the radius of the cylinder C D $= r$, and the distance of the centres B C $= d$ and x any angle L C D, we find the ordinate.

$$\text{I D} = \text{B I} - \sqrt{(r^2 + d^2 - 2\,r\,d\cos x.)}$$

And by this formula the ordinates of the curves have been computed for two different rails, the extreme depth in both being five inches, but the lesser depth in one three inches, and in the other three and three-quarter inches, the latter being that proposed by Mr. Stephenson for the London and Birmingham Railway. The ordinates are taken for each 10°, or for every inch of the half-length, and in the last column are given the ordinates of the true ellipse.

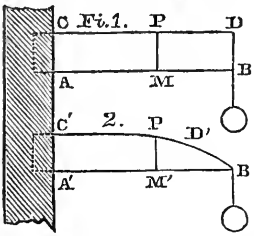
Table of Ordinates.

Abscisses.			Ordinates in Fish-bellied rail. Greatest depth 5 inches. Least do. 3 in.	Ordinates in Mr. Stephenson's rail.	Ordinates in the Ellipse.
Deg.		Inch.			
0	=	0	3.00	3.75	0
10	or	1	3.01	3.76	1.64
20	..	2	3.05	3.78	2.29
30	..	3	3.12	3.82	2.76
40	..	4	3.21	3.88	3.14
50	..	5	3.31	3.95	3.46
60	..	6	3.44	4.04	3.72
70	..	7	3.59	4.14	3.96
80	..	8	3.75	4.23	4.16
90	..	9	3.92	4.34	4.33
100	..	10	4.09	4.45	4.48
110	..	11	4.27	4.55	4.61
120	..	12	4.43	4.66	4.71
130	..	13	4.59	4.75	4.80
140	..	14	4.72	4.84	4.87
150	..	15	4.84	4.91	4.93
160	..	16	4.93	4.95	4.97
170	..	17	4.98	4.99	4.99
180	..	18	5.00	5.00	5.00

We see by this table, (although it is impossible, with any proportions or degrees of eccentricity, to work out a true ellipse by this

method,) that we may approximate towards it sufficiently near for practical purposes, as Mr. Stephenson has done; while, on the other hand, without due precaution, we may so far deviate from it as to render the bar dangerously weak in the middle of its half-length.

As far as relates to ultimate strength, there can be no doubt Mr. Stephenson's rail is equal to that of an elliptic rail, and, consequently, to that of a rectangular rail of the same depth; but there is still an important defect in all elliptical bars, viz: that although this form gives a uniform strength throughout, it is by no means so stiff as a rectangular bar of a uniform depth, equal to that of the middle of the curved bar, and it is the stiffness rather than the strength that is of importance; for the dimensions of the rail must so far exceed those which are barely *strong enough*, as to put the consideration of ultimate strength quite out of the question. The object, therefore, with a given quantity of metal, is to obtain the form least affected by deflection; and, unfortunately, the elliptical bar, although equally as strong as the rectangular bar of the same depth, as far as regards its ultimate resistance, is much less stiff. This will appear from the following investigation.



The deflection which beams sustain when supported at the ends, and loaded in the middle, is the same, as the ends would be deflected, if the beams were sustained in the middle, and equally loaded at the ends, each with half the weight; and the *law* of deflection is the same in the latter case, as when the beam is fixed in a wall, and loaded at its end, although the *amount* is greater. At present, however, our inquiry is not the actual, but the relative deflection in two beams, one elliptical, and the other rectangular, of the same length, and of the same extreme depth, the breadth and load being also equal in each. It is quite sufficient, therefore, to consider the corresponding effects on two half beams, each fixed in an immovable mass, as represented in the preceding figures.

Now, in the first place, the elementary deflection at C is the same in both beams, because the lengths and loads are the same, and the depths at C A equal; but the whole deflection at any other point, P, will be directly as M B^2, and inversely as M P^3. If, therefore, we call M B $= x$, and M P $= y$, the sum of all the deflections in the two beams will be $\int \frac{x^2}{y^3} . \, d\, x \, \triangle$, $\triangle$ being the sine of deflection at C.

But in fig. 1, y is constant and equal to d, (the depth,) while in the latter,

$$y = \frac{d}{l} \surd \, (2\, l\, x - x^2)$$

l being the semi-transverse, or length, and x any variable distance.

The whole deflections, therefore, in the two cases, are,

Fig. 1. Deflection $= \int \frac{x^2\, d\, x}{d^3} \Delta = (\text{when } x = l) \; \frac{1}{3} \frac{l^3}{d^3} \Delta$

And in Fig. 2:—

$$\text{Deflection} = \int \frac{x^2\, d\, x\, \Delta}{\frac{d^3}{l^3} (2\, l\, x - x^2)^{\frac{3}{2}}} = (\text{when } x = l)\ .41\, \frac{l^3}{d^3} \Delta$$

The deflections, therefore, in the two cases, are, with the same weights, as 33 to 41,* or nearly as 3 to 4, a result fully borne out by subsequent experiment. It is to be observed, also, that this investigation applies only to the deflection when the weight is in the middle of the bar, and that it would be much greater in comparison with the parallel rail towards the middle of its half-length.

This want of stiffness is, I should imagine, but badly compensated by the triflng saving of metal thus effected; for I find that an addition of little more than four pounds per yard would convert this rail into a rectangular one of the same depth, which would have one-third more stiffness at its middle point, and probably one-half more, a little beyond the middle of the half-lengths. I am aware, objections are made to rectangular bars having so much depth of bearing in their chairs, and this may be a practical defect, on which I shall offer no opinion; at all events, it is well to estimate properly both evils, and then to choose the least.†

Having thus satisfied myself on the nature of the fish-bellied rail, I proceeded with my experimental inquiries, which I have divided into the following sections.

1. To determine the extension of an iron bar of given area, under different degrees of tension; and hence the force with which the same bar will contract with a given reduction of temperature.
2. The comparative resistance of malleable iron to extension and compression, and thereby the position of the neutral axis.
3. The figure of the area of section, which gives the greatest strength with the same quantity of metal.
4. The strains which bars of given sections are capable of sustaining, without injury to their elastic power.

Experiments to determine the quantity which iron extends, under different degrees of tension.

With a view to this inquiry, an instrument was made as in the an-

* Experiments have been made, from which it has appeared that the fish-bellied rail was stiffer than the parallel rail, which is certainly possible, if the parallel rail be of inferior metal, or of injudicious figure, but it is mechanically impossible, if the parallel bar be made of the figure here assumed.

† It will be seen in a subsequent page, that, by introducing what is called a lower web, that, weight for weight, a parallel rail may be made as strong as the fishbellied, with only an additional depth in the chair of three-quarters of an inch.

nexed sketch. *a b c d* is a piece of brass, about one-fifth of an inch thick, having an arc at top, divided into tenths of inches; *h f g* is a hand, with a vernier, turning freely on a centre, *h;* and *i* is a steel pin, about half an inch long, projecting perpendicularly forward; the distances *f h* to *h i* being as 10 to 1: *e* is a small end, with a screw, for the purpose described below;

Fig. 1.

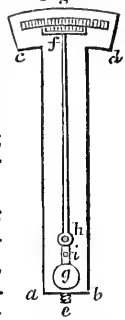
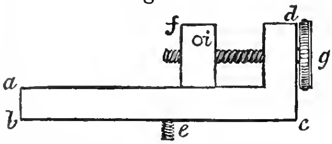
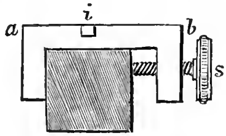


Fig. 2.



a b c d is another piece of brass, having a screw, *e;* *f* is a piece working in a dove-tail, adjustable for position by the screw *g;* and *i* is another steel pin, projecting forward. *a b* is an iron saddle piece, with a set screw, *s;* and at *i*, a hole is tapped to receive the screw *e*, fig. 2, and another saddle piece, exactly like this, is made to receive the screw *e*, of fig. 1.



The iron bars intended to be experimented upon, were made of the annexed form, about ten feet in length; these, by proper bolts and sheckles, were fixed at *a* and *b* in the proving machine;* the

two saddle pieces were then fixed on at the exact distance of 100 inches; the instruments, fig. 1 and 2, screwed into their respective saddle pieces; and a light deal rod hung, by means of two small holes formed in it, (also at the distance of 100 inches,) upon the two pins, *i i;* and then, by means of the set screw, fig. 2, the vernier of fig. 1 was adjusted exactly to zero. The pump of the hydraulic press was now put in action, and after one, two, or more, tons pressure were on, according to the size of the bar, and every thing brought well to its bearing, the hand was again adjusted to zero, after which the index was read for every additional ton. Here it will be seen, that, whatever the bar stretched between the two instruments, the lower pin of fig. 1 was drawn forward, and the index end thrown back ten times that amount, consequently, to ten times the actual amount of the quantity stretched.

It has been observed that after one, two, or more, tons strain were applied to bring every thing well to its bearing, the index was adjusted to zero, and its reading afterwards carefully registered as each additional ton was added. The strain during the experiment was re-

* The Lords Commissioners of the Admiralty having been pleased to allow me any facilities his majesty's dock-yard at Woolwich afforded, for conducting these experiments on a proper scale, the proving machine here referred to is a hydrostatic press, constructed by Messrs. Bramah's, principally for the purpose of testing or proving the iron cables, before they are issued for service. It is an excellent machine of its kind, is capable of bearing a strain of one hundred tons, and is very sensible to a difference of strain of one-eighth of a ton.

peatedly let off, and the index was found to return to zero, till the strain amounted to about nine or ten tons per inch, when the stretching became greater for each ton, and the bar did not any longer regain its original length when the strain was removed, its elasticity with this tension being obviously injured.

These experiments required more attendance than it was possible for one person to give; the adjustment of the weights, the reading and registering the index, required each the undivided attention of one individual; the pumping also required to be watched with care. And I have great pleasure in acknowledging the ready assistance I received from Messrs. Lloyd and Kingston, the Engineers of the yard; from Mr. P. W. Barlow, Civil Engineer; as also from Lieutenant Lecount, who came from Birmingham to witness and assist in the experiment.

Experiments on the Longitudinal Extension of Malleable Iron Bars, under different degrees of direct tension.

TABLE I.

Bar No. 1, 1 inch square. February 21st.			Bar No. 2, 1 inch square. February 21st.		
Weight in tons.	Index Readings.	Parts of the whole bar extended by each ton.	Weight in tons.	Index Readings.	Parts of the whole bar extended by each ton.
2	zero		2	zero	
3	.0625	.0000625	3½	.11	.0000733
4	.156	.0000935	4	.15	.0000800
5	.265	.0001090	5	.24	.0000900
6	.375	.0001100	6	.35	.0001100
7	not observ'd	mean	7	.44	.0000900
8	.562	.0000935	8	.52	.0000800
9	not observ'd	mean	9	.62	.0001000
10	.750	.0000940	10	.70	.0000800
11	.875	.0001250	11	.81	.0001100
			12	1.13	Elasticity injured

Bar No. 3, 1 inch diameter. February 23d.			Bar No. 4, 1 inch diameter. February 23d.		
Weight in tons.	Index Readings.	Parts of the whole bar extended by each ton.	Weight in tons.	Index Readings.	Parts of the whole bar extended by each ton.
1	zero		1	zero	
2	.16	.0001600	2	.15	.0001500
3	.31	.0001500	3	.28	.0001300
4	.44	.0001300	4	.42	.0001400
5	.56	.0001200	5	.56	.0001400
6	.67	.0001100	6	.69	.0001300
7	.79	.0001200	7	.79	.0001000
8	.91	.0001200	8	.97	.0000800
9	.103	.0001200	9	.116	Elasticity destroyed

Mean extension per ton, per square inch, bar No. 1, .0000982. No. 2, .0000903. No. 3, .0001010. No. 4, .0000976. Mean of the four, .0000967.

TABLE II.

Bar No. 5, 2 in. square. February 28th.			Bar No. 6, 2 in. square. February 28th.			Bar No. 7, 2 in. square. March 7th.		
Weight in tons.	Index Readings.	Parts of the whole bar extended by each 4 tons.	Weight in tons.	Index Readings.	Parts of the whole bar extended by each 4 tons.	Weight in tons.	Index Readings.	Parts of the whole bar extended by each 4 tons.
4	zero		4	zero		4	zero	
6	.100		6	.090		6	.065	
8	.180	.000180	8	.150	.000150	8	.125	.000125
10	.240	.000140	10	.210	.000120	10	.175	.000110
12	.290	.000110	12	.250	.000100	12	.230	.000050
14	.350	.000110	14	.290	.000080	14	.280	.000050
16	.400	.000110	16	.335	.000085	16	.335	.000050
18	.450	.000110	18	.375	.000080	18	.385	.000105
20	.500	.000100	20	.410	.000075	20	.435	.000100
22	.550	.000100	22	.445	.000070	22	.480	.000095
24	.600	.000100	24	.485	.000075	24	.530	.000095
26	.650	.000100	26	.525	.000080	26	.575	.000095
28	.695	.000095	28	.565	.000080	28	.625	.000095
30	.740	.000090	30	.620	.000095	30	.670	.000095
32	.790	.000095	32	.660	.000095	32	.715	.000090
34	.825	.000085	34	.730	.000110	34	.755	.000085
36	.860	.000075	36		Full elasticity	36	.805	.000090
38	.920	.000095	38			38	.850	.000095
40	1.05	.000145	40			40	.900	.000095
		Elasticity exceeded						Elasticity perfect

Mean extension per ton, per square inch, No. 5, .0001082. No. 6, .0000297. No. 7, .0000841. Mean, .0000946. Mean of preceding table, .0000967.

Collecting the results of these seven experiments, and reducing them all to square inches, we find that the strain which was just sufficient to balance the elasticity of the iron, was in—

Bar, No. 1,	(re-manufactured iron)	10 tons.
2,	ditto	11 tons.
3,	New Bolt	11 tons.
4,	ditto	10 tons.
5,	(re-manufactured)	9.5 tons.
6,	ditto, from old furnace bars,	8.25 tons.
7,	New bar, by Messrs. Gordon,	10 tons.

We may consider, therefore, that the elastic power of good iron is equal to about ten tons per inch, and that this force varies from ten

to eight tons in indifferent and bad iron. It appears, also, (considering .000096 as representing in round numbers $\frac{1}{10000}$th) that a bar of iron is extended one-ten-thousandth part of its length by every ton of direct strain per square inch of its section; and, consequently, that its elasticity will be fully excited when stretched to the amount of one-thousandth part of its length.

Remarks on the foregoing Experiments.

These results have an important bearing on the question of railway bars. We shall see, in the following section, how they become applicable to the investigation of the transverse strain; but, at present, I shall only speak of them as they apply to the fixing of the rail to the chair. Amongst the numerous models which the directors did Messrs. Rastrick, Wood, and myself, the honour to submit to our inspection, for the purpose of awarding their prize, there were several in which it was intended to fix the rail permanently to the chair—a very desirable object, if it could have been safely adopted; and it was the want of data to enable us to decide on this point, which first led me to propose this course of experiments. The question is now satisfactorily answered. We have seen that, with about ten tons per inch, a bar of iron is stretched $\frac{1}{1000}$th part of its length, and its elasticity wholly excited or surpassed. Again, admitting 76° to be the extreme range of the thermometer in this country between summer and winter, it appears, from the very accurate experiments of Professor Daniell,* that a bar of malleable iron will contract with this change $\frac{1}{2000}$th part of its length. And hence it follows, that if the rails were permanently fixed to the chair in the summer, the contraction in the winter would bring a strain of five tons per inch upon the bar, and a strain of twenty-five tons upon the chair, (the bar being supposed of five-inch section,) thereby deducting from the iron more than, or full, half its strength, and submitting the chair to a strain very likely to destroy it. Every proposition, therefore, for permanently attaching the rail to the chair, is wholly inadmissible.

These remarks may also be carried still farther. If it be dangerous to attach the rail *directly* to the chair, it must be bad in practice to affix it *indirectly* by wedges, cotters, or otherwise, beyond what is absolutely essential to give it steadiness under the passing load, for it is evident that if, by these means, we could prevent any motion taking place, we should fall into the same evil as by the permanent attachment; and if, as most probably will happen, we fail of entirely accomplishing this, still all the friction which is produced, must be overcome by the contracting force of the iron, and be so much strength deducted from its natural resisting power.

The problem, therefore, which engineers have to solve, is, "To find a mode of fixing the rail to the chair, which shall give sufficient steadiness to the former, but which, at the same time, shall produce

* See Phil. Trans. 1831.

the least possible resistance to the natural expansion and contraction of the bar."

The quantity of motion which thus takes place, is certainly but small, viz: about one-eleventh of an inch between summer and winter, with a fifteen foot bar; but the force of contraction is great, amounting to five tons per sectional inch for the annual extremes, and frequently to not less than two and a half tons between the noon and night of our summer season, while the whole power of iron within the limits of its elasticity does not exceed nine or ten tons.

This is an important consideration, and, for want of attention to it, or, rather, in consequence of its amount not having been ascertained, a practice of wedging, or fixing, the rails has prevailed, which must necessarily have been the cause of great destruction to the bars.

I would also suggest here, as a matter deserving the attention of practical men, that, as the bar must necessarily contract, it will draw from that side which is least firmly fixed, and hence all the shortening will, most probably, be exhibited at one end, however slight the hold on either may be; and when it happens that the adjacent ends of two bars both yield, the space between the two is rendered double that which is necessary. To avoid this evil, one of the two middle chairs in each bar might be permanently attached to the rail, in which case the contraction must necessarily be made from each end, and the space occasioned by the shortening of the bars would then be uniform throughout, and much unnecessary and injurious concussion thus saved both to the rail, and to the carriage.

[TO BE CONTINUED.]

¶ *On the Domestic Offices of a House. By* I. J. Kent, *Esq., Architect.*

The Kitchen, a most useful and necessary apartment in every house, being chiefly used for the preparation of food, should be furnished with every thing necessary to enable a cook to perform her duties. It should be as lofty as circumstances will allow: this is a most important point, and should be attended to in all houses. In small houses it is especially necessary, as low kitchens are generally dark, and light is essential both to cleanliness and comfort. In many third and fourth rate houses in London, the kitchens are so low and dark, that the servants employed to wash up the tea things, glasses, and other articles, generally, in such houses, washed in the kitchen, cannot see when they are clean. When cooking is going on, the whole kitchen is filled with steam; the tin covers and other utensils, which ought to look bright, become dim, and every thing has an air of dirt and untidiness. In houses of these classes, therefore, the kitchen ought always to be made more lofty than it is at present; and, instead of the lowest, it ought to be the loftiest apartment in the house. In most parts of England, the kitchen is in the basement story, or on the ground floor; but in Genoa, and many other towns in Italy, it is in the upper story of the house. This is convenient for the escape of smells, but very inconvenient in almost every other respect. Sometimes the kitchen is on the same floor with the dining room, but

detached from the house, and under a flat roof, covered with lead, or, what is termed in London a lead flat. When this is the case, the flat should be pugged (stuffed between the roof and the ceiling with some non-conducting substance,) and ventilated, so as to keep out the intense heat, which would otherwise penetrate the lead. In houses of a superior description, the kitchen should be not only lofty and light, but also well ventilated, or supplied with air flues for carrying off the steam and the effluvia from the food. When this precaution is neglected, even in lofty kitchens, the steam hangs like a cloud below the ceiling, and the smell of the food, when cooking, is often found very unpleasant. Sometimes the escape of these effluvia to the living rooms of the house is prevented by pugging, but this only confines them to the kitchen, while the air flues carry them away into the open air.

Where practicable, the kitchen should look to the north, or the north-east, as should all those domestic offices which require to be kept cool. When the kitchen is under ground, as is frequently the case in England, particularly in large towns, this is not of so much consequence; but it should always be as near as possible to the dining room. In large houses, it is desirable to have a private communication between the kitchen and the dining room, by a passage (and staircase, if the kitchen, &c. are under ground) leading into an ante-room, or waiting room for the servants, adjoining the dining room. This passage should be thoroughly ventilated, so that any escape of effluvia from the kitchen, &c. may be dispersed before it reaches the ante-room. The ante-room should be furnished with broad shelves, fixed to the wall, with drawers beneath, to hold such articles as may be wanted by the servants waiting in the dining room. In some houses there is a hot table, warmed by pipes of hot water, or flues, to set the dishes on, when brought from the kitchen, before they are carried into the dining room.

A kitchen should be dry: the walls must therefore be preserved from damp, if the kitchen be underground, by building them in cement, at least as high as the level of the floor; and, where ground is against any of the walls, it may be necessary to build an inner wall one brick thick, and hollow, against the outer wall; or to build a dry area, carried down below the level of the floor of the kitchen, which area should be ventilated and drained. The floor should be of rubbed Yorkshire stone, laid on brick walls, at least two courses of bricks high above the ground. If the foundation is damp, concrete one foot or two feet thick, composed of clean gravel and fresh burnt stone lime, should be thrown in first, on which the walls should be built; and air should be introduced and made to circulate freely under the stone floor, for which purpose air gratings should be fixed in all the outward walls, and openings for the air to pass through left in all the walls on which the paving is laid.

In very large kitchens, a portion of the floor opposite the fireplace, about the centre of the kitchen, and from six to ten feet square, according to circumstances, should be of wood, that is, of oak joists and sleepers laid on brick walls, with a deal or oak floor. On this

wooden floor the table should be placed, and by this means the cook may generally be able to avoid standing on the stone floor. The skirtings should be made with cement, (not wood) wherever there are stone floors.

The ceiling of a kitchen should be always plastered; for, if this is not done, the effluvia arising from the cooking collect, and remain between the joists, in spite of all the ventilation you can provide; the spaces between the joists also afford shelter for flies, spiders, &c. As the ceilings of kitchens should be scraped, whitewashed, cleaned, and whitened (or coloured,) every year, the expense of plastering is soon repaid by the diminution of the surface; the sides of the joists making a surface of one and a half times more than the whole of the ceiling.

The doors should be all made to open towards the fireplace, otherwise the opening and shutting of them will be likely to cause the chimney to smoke.

The fireplace should be capacious in proportion to the quantity of cooking required; from four to eight or nine feet wide, and never less than two bricks and a half, or one foot ten and a half inches deep. Large fireplaces should be two feet three inches to two feet seven and a half inches deep; the range can then have a proper boiler at the back, supplied with water by a pipe from the main cistern, and regulated by a small feeding cistern, so that the boiler will always be full of water: where this plan is adopted, you will have a supply of hot, if not boiling water, at night as well as by day. A screen, extending the width of the opening of the fireplaces, is quite necessary, when much cooking is required, to render the kitchen complete and comfortable; this may be used as a hot closet, as well as a warmer for the plates and dishes, and it likewise saves fuel, by accelerating the roasting of the meat. In large kitchens there should be a hot plate and preserving stoves on one side of the fireplace, and a boiler on the other; these should be covered over, at the height of six or seven feet, by a projection or canopy from the wall, open in front, and communicating with a flue for carrying off the steam and effluvia from the meat. There should be one or two large closets, from three to four feet wide, and at least eighteen inches deep, for holding spices and other things that may be wanted by the cook.

The principal furniture required in a kitchen are, a table as large as the size of the apartment will allow, and made very strong; and a dresser, or dressers. The tops of these dressers should be two inches thick, and the drawers about two feet wide and seven inches deep. The space under the drawers is sometimes enclosed with doors, and sometimes open, having a pot board the whole width and length of the dresser, and raised three or four inches from the floor. There should be good locks on one or two of the drawers, and two iron or japanned handles fixed on each. A mill for coffee, one for pepper, and another for the finer spices, may be fixed to the ends of the dressers. Ranges of rails, furnished with hooks, should be fixed to the wall for the dish covers, and round towel rollers behind the doors. There should be an ash grate, and pit under the fireplace, and, in

large establishments, a smoke jack, as it is not only the best for roasting meat, but is always ready. Where there is no smoke jack, a bottle jack is generally employed as a substitute; and this, when not in use, should be hung on a hook purposely fixed in the wall, with a small hook near it, for the key. A bottle jack should always be used with a tin stand or case, called a hastener, movable, and standing on feet, with a dripping pan fixed in the bottom. This case is open to the fire in front, but closed at the back and sides. It should be of block tin, and should be kept very bright inside, that the rays of heat may be reflected back on the meat. Sometimes the hastener is made to serve also as a plate warmer. When the bottle jack is not used with a hastener, or, at any rate, not fixed to it, there should be a small notched brass crow fixed to the mantel-piece for it to hang upon.

The Coal Cellar should be placed as near to the kitchen as possible, and should be sufficiently large to hold coals for nine months' consumption. There should be a ready access to it from without, for the men to shoot the coals into it.

The Scullery should be as close to the kitchen fireplace as possible. It should be paved with Yorkshire stone or brick work, and need not be more than nine or ten feet high.

In every scullery there should be a stone sink as large as the space will allow, seven to eight inches thick, leaving room for a plate rack at one end. Under the plate rack, or by the side of it, should be a slanting drip board, to convey the water that runs from the plates and dishes into the sink. A waste pipe should be fixed in the bottom of the sink, and taken into the drain, with a bell sink trap and grating over it; or the waste pipe may be taken into a trap in the drain, and the grating soldered into the sink. Under the sink, or in some other convenient part of the floor, should be fixed a large air-tight sink trap, to carry off the water when the floor is cleaned. There should be no sink stone, (a stone pierced with holes to allow the water to run off, but without any cover,) as that is the most frequent means by which noisome smells escape from the drains. Hot water should be supplied to the sink by pipes taken from the cistern into the boiler at the back of the kitchen fireplace, and there coiled round several times; then conveyed to the sink, and afterwards to the washing troughs in the wash house, when they are situated below the level of the cistern: cold water should be also conveyed to the sink, which may be done in pipes direct from the cistern.

The Larder, or safe, for keeping the meat and other provisions in, both before and after they are cooked, should be large, and, indeed, sufficiently capacious to contain all the provisions. It should be effectually protected from the sun's rays, and yet have a complete circulation all round it, if possible: it should be so placed as not to be near the dust bin or beer casks, or any other place from which dust or putrid or other bad smells can arise: it should be enclosed all round with fly wire panels in wood framing, and should be raised above the paving, in order to admit air at bottom, and to keep it dry. The ventilation should be free at top, and be protected from rain by a

double roof; it should be lofty, and should have strong iron bearers, with hooks to slide on them, so that the meat may hang above the head; and shelves, from eighteen inches to two feet wide round, to put dishes on. A separate safe should be provided for vegetables and fruits, and for game, if there is any quantity of it. For large safes, where it can be contrived, there should be an inner door, with a space between the doors, to enable the cook to shut the one before she opens the other. The outer or first portion of the safe may be used for those provisions that will be wanted first. For small families, one or two iron safes, hanging from some beam in the ceiling, contrived so as to be drawn up out of the way by lines and pulleys, when not in use, with one or more shelves in each, and having fly wire all round, are far better than the safes placed against brick walls, as is most usual.

The Cistern.—Over the scullery may be the cistern intended to supply the whole of the basement story with water. This, whether inside or outside of the building, should always be covered over, and have a flap in the cover to give access to the pipes. The best kind of cistern is formed of quartering framed together, with the bottom and sides boarded and lined with lead. The lead at the bottom should, in ordinary cases, be seven to eight pounds weight to the foot, and that at the sides five to six pounds to the foot; but, where the water has a tendency to corrode the lead, (for instance, if at all impregnated with any kind of salt,) the lead should be proportionably thicker. The pipes to supply the cistern, as well as the pipes from the cistern to serve the different sinks, &c., should be of the kind called by the lead merchant extra strong pipe; particularly those pipes that are laid under the ground, and those that are outside the building, and are exposed to the frost in winter. All pipes outside the building should be covered over, to protect them from injury by blows or frost. The cocks should always be of the very best manufacture, or they will be constant sources of annoyance and expense.

The Beer Cellar and the Wine Cellar.—These cellars should not have any communication with each other. Both should be arched and dry, and neither should ever be placed, if it can possibly be avoided, under the yard: if, however, such a situation be inevitable, the cellars should have solid spandrils, and be covered with two or three courses of plain tiles laid in cement. The wine cellar should be fitted up with bins, and, where large enough, divided so as to form an inner and an outer cellar; perhaps the best method of dividing the bins is by walls half a brick thick, and carried up to the top with horizontal York stone shelves every three feet, to divide the bins in their height. As some wines require a warmer temperature than others, the pipes that are to supply the several sinks with hot water, may be carried through some of the bins, or through that portion of the cellar which is separated by a brick wall, and thus a warm cellar may be obtained at a very small expense.

In large, or first rate houses, a butler's pantry, or footman's room, a housekeeper's room, and a servants' hall, are indispensable. These rooms should all have wood floors in the centre, with a course of

stone paving, two feet wide, all round against the walls. The floors should be laid hollow on brickwork, as described for the kitchen, and the skirting should be of cement. An air flue, carried up from the hollow space under the floor, close to the chimney, would be very desirable, to keep up a constant current of air under the floors. The sinks in these rooms (of which there should be two in each, fitted up in a window recess,) should be lined with lead. They should be each about eighteen inches, or two feet, long, and twelve or fifteen inches wide, side by side, and about twelve inches deep; each should be covered with a flap, and have the space beneath it enclosed with doors, to form closets, with a shelf in each. One of the sinks should have a brass grating, about three and a half inches in diameter, soldered into the bottom, with a wood drainer for decanters, &c., and the other a washer and plug with a chain. A waste pipe should be soldered into each sink, but none of these pipes must be taken into the drain without the intervention of some trap, otherwise the foul smells from the drains will be a source of annoyance. Waste pipes of this kind are sometimes allowed to empty themselves into the open area over a sink stone trapped.

The Housekeeper's Room should have a series of closets, two feet deep; some with shelves for linen; others for pickles and preserves; and, again, others with drawers for stores of various kinds.

The Footman's Room, or Butler's Pantry, should have, in addition to the sinks, a large dresser, fitted up with drawers and closets underneath; with a wide shelf continued all along the room, above the level of the top of the door. Adjoining this room should be a fireproof plate closet, ventilated and kept sufficiently warm to prevent it from being in the least damp. The pipes that convey the hot water to the several sinks, may be made to pass round this plate closet, as well as through the wine cellar, as, when damp gains admittance, it causes double trouble to the footman, by tarnishing the plate. The plate closet should be fitted up with shelves, lined with thick drugget.

The Passages should be well lighted and ventilated; otherwise the smells arising from the drains, the kitchen, &c., will be carried up into the body of the house, the air above being more rarefied than that below. The passages should be paved all over with stone or brickwork, with the skirtings of cement, and the walls plastered with stone lime and sand, lined out into blocks, in imitation of stones, and coloured. Plastering of this kind is much more durable than plastering composed of chalk, lime, and dirt, such as is now generally used, and is very little more expense. The bell board should be fixed in the passage between the kitchen and the servants' hall; each bell should have a pendulum attached to the spring, and the names of the rooms written on the bell board below the bells.

Manor Place, Paddington, July 25, 1834.

[*Loud. Arch. Mag.*

¶ *On Ventilation, particularly as applied to Hospitals and Sick Wards.* *By* J. A Picton, *Esq.*, *Architect.*

The processes of warming and ventilating public buildings are so closely connected in principle, that they ought never to be attempted separately; yet we frequently see large sums of money thrown away in vain struggles to perform what a little attention to the principles of pneumatics would have shown to be impracticable. In churches, chapels, theatres, and other buildings where great numbers are assembled in a small space, the rarefaction of the air proceeds with such rapidity, that little difficulty is experienced in obtaining a circulation sufficient to keep the atmosphere tolerably pure. The greatest art required is in proportioning the apertures for the admission and exit of air to each other, and to the quantity of pure air requisite for the supply of the greatest number the building is capable of containing; and also in so arranging them, that the change of atmosphere may take place without any perceptible draft or current. There is rather an important defect observable in most of the apparatus employed for warming public buildings by heated air, viz: that when the apartment is sufficiently heated, and it is desirable to prevent the temperature rising, there is no mode of immediately effecting this, but by stopping the supply of air entirely, or by opening the windows, so as to admit an unpleasant draft. This might easily be accomplished by connecting a cold air flue with the flue for heated air; having a register for closing it either wholly or partially, so that the temperature of the air admitted might be regulated with the utmost nicety.

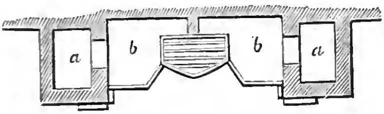
The ventilation of hospitals and sick wards, so as to secure a constant and regular change of atmosphere, (whatever may be the difference of temperature within and without the building,) is by no means an easy task. The self-regulating principle, at first sight, appears extremely desirable, as it relieves the attendants of all trouble and responsibility. The mode pointed out by your correspondent, Mr. Milne, is extremely ingenious and elegant; but, in its adaptation to the purposes now under consideration, I am afraid it would fail, from the operation of several causes. In the first place, as it depends for its efficacy entirely on the *excess* of temperature of the air in the room over that without, should the difference be very slight, or the excess be the other way, it would become wholly inoperative. Suppose, for instance, the temperature in the open air to be eighty degrees, and inside the apartment sixty-five or seventy degrees, (no very uncommon case) and the rarefaction produced by respiration equal to ten degrees; it must be evident that the circulation will be extremely languid, if, indeed, it exist at all, and at a time of the year, too, when most needed. In a room of the description I am now speaking of, the rarefaction of the air, by respiration, proceeds comparatively slowly; and it is quite possible for the air in a room to become unfit for respiration with little or no increase of temperature. As the specific gravity of the carbonic acid gas and the nitrogen emitted from the lungs, does not differ materially from that of pure atmospheric air, it is only by affecting the general temperature of the air in the

apartment that the circulation is produced. Another disadvantage attending the plan is, that the delicate balance which is necessary to be preserved would be extremely liable to be deranged in the damp atmosphere of this country, whether the pivots on which the louvre-boards work are of metal or of wood. In high winds, too, the effect of the air externally on the broad surfaces of the louvre-boards would tend greatly to derange their operation. The principal disadvantage of the plan, however, consists in this: its obvious tendency is to preserve a certain relative proportion between the external and internal temperatures; or, in other words, to quicken the circulation when the difference is great, and to diminish it when the difference is small, without reference to the absolute height at which the thermometer may stand: hence it necessarily follows, that if the apertures are calculated to change the air with sufficient rapidity in the heat of summer, when the difference is very slight, they will occasion an enormous waste of heat in the winter, when the difference is very great, by carrying off the air too quickly; or, on the other hand, if calculated for ventilation as required in the winter, they will fail to answer the purpose in the summer. If it be replied that the equilibrium of the dampers can be occasionally altered, so as to require a greater or less pressure on the lower surface to produce the same effects, it is obvious that the great advantage of the self-regulating principle will be entirely lost. I am quite prepared, however, to admit that the principle is an excellent one, and, could the practical defects I have pointed out be avoided, it would be worthy of a trial.

Perhaps the very best method of ventilating any building where it is requisite to produce an artificial current, is by having a fire in a close chamber in the roof or upper part of the building, the only supply of air to which is procured by means of flues communicating with the different wards or rooms to be ventilated. These flues, which might be furnished with registers, or slides, to adjust the ventilation, would cause a constant and regular change of atmosphere under all possible circumstances, and at all seasons of the year. This plan, however, would in all cases be expensive, and in many instances impracticable. Probably the next best mode is to let the air admitted be, as nearly as possible, of the temperature which it is desirable to preserve in the apartment; with a sufficient number of apertures, furnished with slides, in such situations in the upper part of the room as may be most convenient for the exit of the air. When the air in the apartment is warmer than that outside, of course it will have a constant tendency to rise and escape. In the heat of summer, if it is possible to procure a supply of cool air from below ground, and at the same time to heat the air above the room, so as to cause it to rise, it is evident the cooler air will be forced by the atmospheric pressure to supply its place, and a temperature below the average of that outside will be maintained. In a Lock Hospital lately erected by the trustees of the Liverpool Infirmary, designed by myself, and executed under my superintendence, an attempt has been made to combine these advantages, and, hitherto, with complete success. The wards for patients are rooms about fifty feet by twenty, and thirteen feet

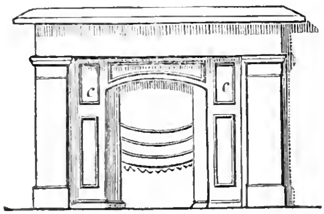
six inches high, containing about fifteen or sixteen beds in each. There is no basement story, and the vacant space under each floor communicates with the external air by a number of small gratings. Two air flues in the jambs of each fireplace are open below, and communicate with the back of the grate just above the floor. The grates,

Fig. 1.



of which there are two in each apartment, are registers, with air chambers running completely round the back and sides, but separated in the middle. *Fig.* 1 shows the plan of the grate and jambs, and *Fig.* 2 the front view: *a a* are the flues on each side the fireplace; *b b* the air chambers; and, by a lining of brick inside, the air is made to pass within

Fig. 2.



three inches of the heated back and sides of the grate; *c c* are the slides for the admission of warm air into the apartment. These grates were executed by Messrs. Pooley and Son of Liverpool. It will be seen, by the plan, that none of the heat at the back and sides of the fire is lost; but, being communicated to the air admitted from below, a fine stream of air, warmed, but not heated unpleasantly, is constantly pouring through the orifices into the room. For the escape of the air, there are six flues provided in each ward, about fourteen inches by nine inches each, built in the walls, and opening at the top into the space between the ceiling and the roof, with two apertures to each flue from the room, one at the top near the ceiling, and the other a little above the floor, each furnished with a slide. For the escape of the air from the space under the roof, pagoda caps, formed of concentric rings of cast iron, about two feet in diameter, are fixed, one on the roof of each ward. If it is required to preserve as much heat as possible in the apartment, by closing the whole of the upper slides, the air being able to escape from the bottom apertures only, the whole mass of air in the room must be heated to one temperature before any can be permitted to escape. In like manner, by opening or closing any portion of the slides for the admission or exit of the air, the temperature and ventilation may be regulated at pleasure. In the summer, the air in the space under the slates, being highly rarefied by the direct action of the sun's rays on the upper surface, is continually passing off through the caps; while the air admitted through the apertures *c c*, coming from the subterranean space below the floor, is considerably below the temperature outside. In addition to this, the windows can, of course, be opened when requisite; and, being all on one side of the rooms, and a considerable height from the floor, any unpleasant draft is avoided. Of the efficiency of the above plan, I can speak with the utmost confidence; and its simplicity and cheapness will, I think, be evident on inspection. The warmth diffused by the grates is such,

that, though two are fixed in each ward, of the size mentioned above, it has never been found necessary to use more than one at a time.

Liverpool April 18, 1834.

[*Loud. Arch. Mag.*

¶ MANUFACTURE OF VARNISHES.

(Continued from vol. xiv., page 353.)

DIRECTIONS FOR BOILING OIL.

Linseed Oil.

Put twenty-five gallons of linseed oil into an iron, or copper, pot that will hold at least thirty gallons; put a fire under, and gradually increase the heat, so that the oil may only simmer, for two hours; during that time the greatest part of its moisture evaporates; if any scum arises on the surface, skim it off, and put that aside for inferior purposes.

Then increase the fire gradually, and sprinkle in, by a little at a time, three pounds of W. B. scale litharge, three pounds good red lead, and two pounds of Turkey umber, all well dried, and free from moisture; if any moist driers are added, they will cause the oil to tumefy, and, at the same time, darken the oil, and cause it to look opaque and thick, ropy and clammy, and hinder the oil from drying and hardening in proper time; besides, it lies on the working painting like a piece of bladder skin, and is very apt to rise in blisters. As soon as all the driers are added to the oil, keep quietly stirring the driers from the bottom of the pot, otherwise they will burn, which will cause the oil to blacken and thicken before it is boiled enough. Let the fire be so regulated that the oil shall only boil slowly for three hours from the time all the driers were added; if it then ceases to throw up any scum, and emits little or no smoke, it is necessary to have recourse to a few quill tops or feathers. Dip a quill top in the oil every two minutes, for when the oil is boiled enough, the quill top will crackle or curl up quite burnt; if so, draw out the fire immediately, and let the oil remain in the pot at least from ten to twenty-four hours, or longer, if convenient, for the driers settle much sooner when the oil is left to cool in the pot than when it is immediately taken out.

Boiled oil ought always to be kept in casks set on end, or in leaded cisterns screened from the sun; lead cisterns assist its clarification and its drying quality. Keep drying or boiled oil from the air and sun, as it is apt to become viscid or glutinous, or what is termed fat. Good oil, boiled according to these directions, will be pale, thin, limpid, and brilliant; will work and extend freely under the brush or pencil, and will dry glossy and hard without leaving any tack. Some boilers of oil add rosin to their boiled oil, in order to enable them to increase its quantity, and so to undersell the fair dealer; but all oil so adulterated is very pernicious to the colours, as it long retains a soft clamminess, works tough and pasty under the brush or pencil, and lastly, even when dry, its surface blackens, and soon decays,

leaving the work it was intended to preserve to be alternately scorched by the sun, and rotted by the weather.

Poppy Oil

Is extracted from the seeds of the white poppy, and is very sweet and unctuous, and requires a preliminary preparation to render it more drying. As it is less coloured than other oils, it is preferred for delicate kinds of painting, from a notion that delicate colours are not so apt to change, if ground in this oil, in preference to others. I here subjoin two processes for giving a drying quality to oil of poppies.

Into four pints of pure soft water, put two ounces of foreign white copperas; warm the water in a clean copper pan, or glazed earthen jar, until the copperas is dissolved; pour the mixture into a clean glass, or stone, bottle, large enough to contain three gallons; then add to the solution of copperas one gallon and a half of poppy oil; cork and agitate the bottle regularly and smartly for at least two hours; then pour out the contents into a wide earthenware dish; leave it at rest for eight days, when the oil will be clear and brilliant on the surface, and may be taken off with a spoon or flat skimmer, and put up in a glass bottle, and exposed to the light, which in a few weeks renders the oil exceedingly limpid and colourless.

Second Process.—Into four pints of pure soft water put two ounces of white copperas; warm the water as before; pour it into a glass bottle; then add one gallon and a half of poppy oil; one ounce of calcined magnesia, and one ounce of powdered manganese; cork and agitate the bottle smartly for at least two hours; have in readiness a new flannel bag, large enough to hold the contents of the bottle, which is to be emptied into the bag, suspended over a broad earthenware dish, so as to receive the oil and water as it drops from the bag; when the fluid has passed through the bag, the absorbents are to be thrown out, the bag washed and kept until another occasion; the oil and water, after being left at rest for a week, may be separated as before directed, and the oil put up to the light; and the longer it is kept before using, the paler and more drying it becomes.

Nut Oil, or Oil of Walnuts,

Is extracted by expression; and that which is extracted without heat is certainly the most pale, pure, and nutritive seasoning, and retains an exquisite taste of the fruit. That designed for the arts, is of inferior quality, and is plentifully imported to us from France; the heat it undergoes in its torrefaction previous to its expression, disposes it to dry more quickly than that expressed by the cold process; but, at the same time, the heat, though it frees it from its unctuous quality, gives it more colour. When it has been extracted by the cold process, it may be prepared in the same way as directed for the poppy oil.

Trans. Soc. for Encour. of Arts, &c.

On the Essential Oil of Spruce, for the preparation of which, the Silver Medal of the Society for the Encouragement of Arts, &c., was awarded to J. Aylwin, Esq., of Quebec.

The substance called essence of spruce, and employed chiefly in Germany in the preparation of a particular kind of malt liquor called spruce beer, is, properly speaking, an extract. It is made in Canada from two species of pine, the *Canadensis* and *Nigra*, by boiling the young shoots in water, straining the liquor, and then cautiously evaporating it to the consistence of a soft extract, like treacle.

The extract thus prepared contains a certain quantity of turpentine, to which its peculiar flavour is owing; but the essential oil of the turpentine, in which the odour and flavour chiefly reside, is almost entirely driven off, together with the watery vapour, and dissipated in the air during the boiling and evaporation in an open vessel.

Mr. Aylwin, with a view of improving the quality of the extract of spruce which he is in the habit of preparing, substituted a common still and worm tub for the open boiler heretofore used, and thus obtained an extract of better quality than usual, as well as a quantity of essential oil, analogous to the oil of turpentine obtained by the distillation of common turpentine. A small proportion of the essential oil was mixed with the extract, in order to improve its flavour; and it became an object of some importance to discover the most profitable use to which the remainder could be applied.

There was no doubt that it would answer the same purpose as common oil of turpentine; but as the cost of obtaining it is considerable, (from twenty-five to thirty shillings a gallon, according to Mr. Aylwin,) it would be impossible, even under the most favourable circumstances, to afford it at the same price as oil of turpentine.

Some experiments were, therefore, made on its power of dissolving the harder resins, and especially copal, with the view of preparing, by means of it, a varnish more durable, and less coloured, than common copal varnish. It was found that when the boiling hot vapour of this essential oil is brought in contact with copal, the two substances readily unite, and a nearly colourless liquid varnish is the result, which, when spread on the surface of wood, metal, &c., dries speedily and perfectly by the volatilization of the essential oil, leaving the surface covered with a closely adhering layer of, apparently, pure copal.

A specimen of this varnish was sent to the Society, together with some of the essential oil.

The varnish was nearly colourless, and very liquid, but contained too small a proportion of copal, which, added to the very hazardous mode of preparing it, greatly diminished the probability of its usefulness in, at least, this mode of application.

The only very obvious differences between essential oil of spruce and good colourless oil of turpentine, are, that the odour of the latter has some resemblance to that of cajeput oil; and its specific gravity, compared with that of water, is 0.9294, whereas that of oil of

turpentine is, when recently rectified, 0.85, and after a year's exposure to light, 0.96. (See "Tingry on Varnishes," p. 262.)

The light oil of turpentine is incapable of dissolving copal; but that which has become heavy, by exposure for a year to the sun's light, will dissolve it in sufficient proportion to form a varnish. It appeared probable, therefore, that oil of spruce, being heavier than recent oil of turpentine, might also form a varnish with copal. Some was accordingly placed at the disposal of Mr. C. Varley; and the result of that gentleman's experiments is stated in the following letter:—

Sir,—

I have tried the effect of the essential oil of spruce, which the Committee on Chemistry placed in my hands, as a solvent of copal, in comparison with spirits of turpentine, and also with a new liquid from condensed oil gas, which Mr. Faraday favoured me with for that purpose; and the result shows that it is a very good and desirable solvent, for it very nearly equals oil of lavender, (a very expensive oil), and surpasses it in purity, or freedom from colour. Yet alone, it has a very serious defect: it dries so slowly as to require nearly a week to become quite hard, and its solvent power is active enough very soon to soften the paint it is laid on. This would be quite fatal to its use; but by combining alcohol with it, the copal is more perfectly dissolved, making a varnish that soon dries, leaving a glossy surface free from tackiness, though it is not quite hardened till after a day or two; so that, under these circumstances, it is the best article yet produced for making copal varnish. It is heavier than spirits of turpentine; and what it dissolves increasing its density, it more nearly approaches that of the softened portion on which the alcohol has the most effect; and probably it is on that account that they are compatible, for they do not separate. Thus the whole of the copal, though yet ropy, is rendered sufficiently soluble to be used as a varnish; whereas that made by spirit of turpentine and alcohol always separates into two portions, and, if shaken up, appears white and milky, or soapy, showing that they are not compatible, and cannot be used together as a varnish; but when settled, the clear varnish must be poured off: this latter, indeed, is a perfect and excellent varnish, free from colour, and dries quickly; but it leaves the largest portion of the copal behind; and if you use that, it spreads ropy, like slimy leather; and when it feels dry, it will, during a day, rub off like a film of India rubber, showing but little adhesion to the surface; for I must remark, that copal has a tough portion, which requires a year's action of spirits of turpentine only to soften it enough to enable you to stir it. On this portion the alcohol acts, and enables you to obtain as good a varnish in a week as without it would take a year, or otherwise almost continual grinding up, to wash out all the soluble part. And in all cases, the finer the copal is pulverized, the quicker the varnish is made, as the tough portion obstinately fences the soluble part. Heat always quickens the solution, but is injurious, as it almost always developes some colour from colouring matter accidentally in the copal. I therefore prefer time and frequent shaking up, or excessive

grinding, and previously pick out every visible impurity. I apply the alcohol first in just sufficient quantity thoroughly to wet the powder, as it quickly softens the tough part, and afterwards add the other solvent.

The oil from condensed oil gas is also a very powerful solvent of copal, leaving a very soft precipitate instead of any tough portion, and quickly dries, free from tackiness, and appears tough, therefore not liable to crack; but it has a great defect in being so very yellow as to preclude its use in pictures, to which may be added a very disagreeable smell; but if re-distilling, or any other means can be found to free it from colour, or by purer materials to make it without colour, it would be highly valuable as the best solvent of copal. Alcohol is also beneficial, even with this solvent: but as it is, it may probably serve as a very good varnish, or japan, in cases where the colour is no object.

I am, &c. &c.

CORNELIUS VARLEY.

A. AIKIN, *Esq.*, *Secretary*, *&c. &c.*

P. S. This is accompanied with some specimens of copal in the three solvents, with and without alcohol. [*Ibid.*

Description of the Puncturing Forceps, for which the large Silver Medal was presented to Captain Bagnold, R. N.

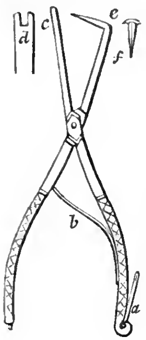
January 20th, 1834.

SIR:—

The numerous, and frequently fatal, accidents that happen to the surgical profession from the inoculation of morbific matter in the pursuit of pathological examinations, being too well known to require any demonstration from me, I beg to lay before the Society a new instrument which I have invented for the purpose of preventing such inconvenient and melancholy results. It has been exhibited and used by myself in the presence of several professional gentlemen, who highly approve of it; and I am convinced it will completely prevent the possibility of accident in the most dangerous part of post mortem examinations, viz: the operation of sewing up the body:

The forceps are to be held in the left hand; the lower or projecting jaw pushes back the fat under the skin, and when the instrument is closed, a puncture is made through the integuments. A slight pull by the hand of the operator enlarges the puncture sufficiently to allow the passage of a *blunt needle instead of a pointed one.* The instrument is suffered to expand by means of its spring; and a hold being again taken on the opposite flap of the incision, the ligature is again passed; and the operator may place the stitches within one-eighth of an inch of each other, if he thinks it requisite, without the necessity of once bringing his fingers in contact with the subject, and in half the time that it can be done by the needle as hitherto used. A veterinary surgeon to whom I have shown it, is of opinion that it is admirably

adapted for sewing up incised wounds in horses, and other cattle,



whose strength and restlessness render the operation difficult with the usual needle.

I am, &c. &c.

THOS. BAGNOLD.

A. AIKIN, *Esq.*, *Secretary*, *&c.*

In the annexed figure, *a* is the clip, *b* the spring, *c* the lower jaw, with a slit cut at the end of it, as shown at *d*; *e* the upper jaw, the end of which is turned down at right angles, and is made sharp at the end, so as to pierce a hole through the integuments by pressing it through the slit in the lower jaw. *f* is an end view of *e*, showing a groove, or channel, made in it to serve as a guide to the needle. [*Ibid.*

Notice of an improved Lamp Post in use in Edinburgh. *By* JOHN ROBISON, *Esq.*, *Sec. R. S. E.*, *&c.*

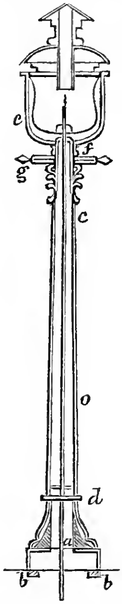
The lamp pillars now in use in this city are, I think, worthy of your notice: they, in the same way as the mile marks, combine durability, effectiveness, and economy with a graceful outline. I had to contend with much prejudice and opposition in getting them introduced; but they have now made their way into some twenty or thirty different places, including New South Wales. Previously to their introduction here, it was held as an axiom that square lanterns were better fitted for gas lights than globes, and that their maintenance was less expensive. Experience has proved both positions to be false, as, by providing, in the construction of the top, a chimney for the discharge of the watery vapour of combustion, it is found that the globes remain undimmed in all weathers, and protect the flame from being blown out when the wind extinguishes that in the lanterns. The expense of repairing damaged lanterns is also found to exceed that of renewing broken globes, in a very unexpected proportion. The lamp pillars serve the purpose of indicating the names of the streets, which are cast in relief on the bar against which the lamplighter's ladder is reared, and are painted white.

The lamp pillar consists of two pieces of cast iron, and a frame of wrought iron for the support of the glass. The annexed figure is a section of this lamp pillar, showing the construction of the parts within.

In erecting the pillar, the base (*a*) is set on the stone by the assistance of a spirit level, and the butts (*b b*) are bedded into the stone, level with the pavement, and secured by lead. The shaft *c c*, (previously adjusted to its base at the foundery,) is then slipped on it, and the key driven through as at *d*, which confines the shaft and the base firmly together.

The lamp iron, or frame, (*e*) is attached to the head of the pillar,

and is secured, upon the same principle, by two screwed pins at *f*. The cross bar (*g*) for the lamplighter's ladder to be placed against,



is made flat on the face, and a little thicker below than above, to allow of the light striking on its surface, on which the names of the streets, &c., in which the lamps are to be placed, is to be cast in relief on both sides. The pillars are to be painted of a dark colour, and the letters made white.

The glasses are open at bottom, with an inch and a half aperture as a vent hole; but, in order to prevent the wind from disturbing the flame, a disk of tinned iron slides on the gas pipes to a regulated distance from the opening.

The covers are constructed as shown in the figures having a chimney in the centre, for the purpose of maintaining a current of air through the interior of the lamp, and to carry off the watery vapour generated by the combustion of the gas, which would otherwise condense on the surface of the glass, and obscure the light.

The experience of last winter has shown that this construction of lamp post possesses an important advantage over those previously used here. It throws very little shadow beyond its own base; the lights burn steadily in the most stormy weather; the casualties to the glass have been much diminished; and the difficulty of climbing the pillar (from the absence of projecting ornaments) has put a stop to the stealing of the brass-work in the burners. The dust, likewise, from finding no lodgment, is washed away by every shower.

Edinburgh, February, 1833. [*Loud. Arch. Mag.*

List of American Patents which issued in June, 1835.

		June
311.	*Thrashing machine.*—William Laighton, Portsmouth, N. H.	6
312.	*Measuring distances.*—Samuel Stone, Long Green, Baltimore co., Md.	6
313.	*Gold extracting machine.*—Nathaniel Bosworth, city of Philadelphia,	6
314.	*Coffins from cement.*—D. Dayton & J. White, Salina, N. Y.	6
315.	*Truss for hernia.*—John Heintzelman, city of Philadelpnia,	6
316.	*Stove, pyramidal.*—Thomas M. Southwick, Troy, N. Y.	6
317.	*Hoisting brick, &c.*—Jesse Rinehart, Danville, Illinois,	6
318.	*Hulling clover, &c.*—W. Braley, and J. Walker, Somerset co., Md.	6
319.	*Thrashing machine.*—H. Edgar, and J. W. Edgar, Wayne co., Ohio,	6
320.	*Cooking stove.*—Elijah Skinner, Sandwich, N. H.	12
321.	*Fireplace.*—J. A. Bean, and E. Skinner, Sandwich, N. H.	12
322.	*Thrashing machine.*—T. Rucker, Jr., assignee of P. Cheeks, Murfreesboro, Tenn. . . .	12

		June
323.	*Platform balance.*—Alexander Bliss, Benson, Vermont,	12
324.	*Bridges.*—George Law, Easton, Penn.	12
325.	*Cheese press.*—David Phelps, Bangor, Maine,	12
326.	*Fireplaces.*—Joseph Snyder, city of Philadelphia,	12
327.	*Stoves.*—John C. Parry, Pittsburg, Penn.	12
328.	*Saw set.*—Herrick Aiken, Middlesex, Mass.	12
329.	*Splitting leather.*—Herrick Aikin, Middlesex, Mass.	12
330.	*Pumps, fire engines, &c.*—Henry Gates, Northampton, Mass.	12
331.	*Warming buildings.*—Robert Rogers, South Berwick, Maine,	12
332.	*Raising water.*—David W. Hunt, Newburyport, Mass.	12
333.	*Mortising machine.*—Jonathan Page, Henniker, N. H.	12
334.	*Oven.*—Samuel Pollard, Bucksport, Maine,	12
335.	*Shaving staves, &c.*—John Everhart, Wayne, Warren county, Ohio,	12
336.	*Shelling and grinding corn.*—G. M. Weaver, Montgomery Square, Pa.	12
337.	*Hames.*—Sereno Norton, East Bloomfield, New York,	12
338.	*Saddles, spring seat.*—J. G. Palmer, H. & A. Beard, Greenville, Va.	12
339.	*Propelling by weights.*—Elisha Turner, Pownal, Maine,	12
340.	*Refrigerator.*—John Waring, Port Tobago, Va.	12
341.	*Hoisting machine.*—Barnabas Pike, city of New York,	12
342.	*Friction wheels.*—Julien Nicolet, Pittsburgh, Penn.	12
343.	*Bee house.*—William Groves, Harrisburg, Penn.	12
344.	*Shingle machine.*—Samuel B. Chapman, Camden, N. J.	15
345.	*Winnowing machine.*—Jeremiah Nicols, Kent county, Md.	15
346.	*Mortising and tenoning.*—Joseph H. Darby, Leominster, Mass.	15
347.	*Washing machine.*—Charles Otis, Finksburg, Maryland,	15
348.	*Auger.*—William Jones, Portsmouth, Virginia,	15
349.	*Paper ruling machine.*—James C. Teasdale, Dansville, New York,	15
350.	*Sausage meat, cutting.*—A. and J. Keagy, Morrison Cove, Pa.	15
351.	*Undershot wheel.*—Ebenezer Cochran, Princeton, Indiana,	15
352.	*Spinner, accelerating.*—Leonard Norcross, Dixfield, Maine,	15
353.	*Stumps, removing.*—Leonard Norcross, Dixfield, Maine,	15
354.	*Cotton, thinning.*—Jordan Gatling, Murfreesborough, N. C.	19
355.	*Hulling clover seed.*—John P. Ridings, Hillsborough, Ohio,	19
356.	*Bellows for forges, &c.*—John C. Concklin, Peekskill, N. Y.	19
357.	*Boot cramp.*—Nathan Ayer, St. Johnsbury, Vt.	19
358.	*Check plates for banks, &c.*—Charles C. Wright, city of New York,	19
359.	*Brick machine.*—T. Miles Bannister, Phelps, New York,	19
360.	*Steam engine piston.*—B. Wright, and G. Ketchum, Calhoun co., M. T.	19
361.	*Mortise lock.*—John G. Hotchkins, New Haven, Conn.	19
362.	*Boiler pipes, fixing.*—John Goulding, Dedham, Mass.	19
363.	*Skins, softening.*—Eli Kendall, Ashby, Mass.	19
364.	*Boilers, culinary.*—Anson W. Spencer, Cazenovia, New York,	19
365.	*Mowing machine.*—J. Sturdevant, and J. Holmes, Portland, Me.	19
366.	*Cotton planting.*—Jordan Gatling, Murfreesborough, N. C.	20
367.	*Smut mill.*—John Card, Genesee county, N. Y.	20
368.	*Stove.*—James Atwater, New Haven, Conn.	20
369.	*Mortar mixing.*—J. Everhart, and L. Swimley, Washington, D. C.	20
370.	*Pressing brick.*—William Wadsworth, Hartford, Conn.	26
371.	*Cooking stoves.*—Le Grand Fairman, Orleans county, New York,	26
372.	*Ovens and stoves, heating.*—Charles Vale, Newark, N. J.	26
373.	*Cutting straw, &c.*—J. M'Math, Crawford county, Penn.	26
374.	*Trees, felling.*—James Hamilton, city of New York,	26
375.	*Shelling corn.*—J. V. Dunbar, and A. Powers, Portland, Maine,	26
376.	*Cooking stove.*—T. D. Burrall, Geneva, New York,	26
377.	*Napping machine.*—Reuben Daniels, Woodstock, Vt.	26
378.	*Rotary steam engine.*—Orson Barnes, Van Buren, N. Y.	26

CELESTIAL PHENOMENA, FOR SEPTEMBER, 1835.
Calculated by S. C. Walker.

Day.	H'r.	Min.					
7	7	5	Im.	2 Piscium,	,4,6,	N. 55°	V. 5°
7	7	37	Em.			359°	310°
12	13	55	Im.	34 Tauri,	,7,	161°	112°
12	14	58	Em.			255°	216°
28	8	12	Im.	*g* Sagittarii,	,5,6,	62°	90°
28	9	15	Em.			306°	345°

Meteorological Observations for May, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	48°	60°	29.80	29.80	NE.	Moderate.		Clear day.
	2	46	64	.80	.84	NW.	do.		Clear day.
	3	55	66	.03	30.00	W.	do.		Clear day.
	4	57	70	.86	29.70	SE. S.	Calm.		Clear—lightly cloudy.
☾	5	52	79	.65	.66	SE. S	Moderate.	0.03	Fog—hazy—rain in night.
	6	48	65	.76	.76	E. SW.	do.		Cloudy day.
	7	47	67	.90	.90	NE. SW.	Breeze.		Lightly cloudy.
	8	52	59	.70	.65	SW.	do.		Cloudy—showery.
	9	45	49	.75	.75	SE.	Moderate.	0.31	Rain—cloudy.
	10	40	53	.70	.70	NE.	do.		Cloudy—flying clouds.
	11	44	66	.85	.60	W.	do.		Clear day.
☺	12	46	71	.90	.86	W.	do.		Lightly cloudy—clear.
	13	48	71	.86	.90	SE.	do.		Clear—rain in the night.
	14	47	55	.70	.53	SE.	do.	1.25	Rain—cloudy.
	15	43	58	.53	.55	N.	Blustering		Cloudy—flying clouds.
	16	41	60	.60	.60	W.	do.		Clear—flying clouds.
	17	46	72	.75	.83	W.	do.		Clear day.
	18	55	80	.86	.90	W.	Brisk.		Lightly cloudy—clear.
☽	19	61	84	.90	.90	SW.	do.		Lightly cloudy—clear.
	20	63	84	83	.83	SW.	do.	0.75	Clear—shower in ev'g, thunder & [light'g.
	21	60	65	.80	.83	SW. E.	do.	0.03	Clear—cloudy—rain.
	22	50	68	30.00	30.05	E.	do.		Cloudy—clear.
	23	44	64	.20	.30	E.	do.		Clear day.
	24	53	68	.30	.20	SW.	do.		Clear day.
	25	53	80	29.80	29.85	SW.	do.		Lightly cloudy—clear.
	26	62	82	.76	.76	W.	Moderate.		Cloudy—clear.
⊗	27	64	63	.76	.80	E.	do.	0.12	Cloudy—rain.
	28	54	83	.83	.83	SE.	do.		Cloudy day.
	29	65	78	.65	.60	SW.	do.	0.05	Cloudy—flying clouds—rain.
	30	62	75	.65	75	W.	do.		Cloudy—flying clouds.
	31	63	82	.90	.85	W.	do.		Clear—flying clouds.
	Mean	52.22	69.06	29.78	29.81			2.54	

	Thermometer.	Barometer.
Maximum height during the month,	84. on 19th & 20th,	30.30 on 23d & 24th.
Minimum do.	40. on 10th.	29.3 on 3d.
Mean do.	60.64	29.79

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

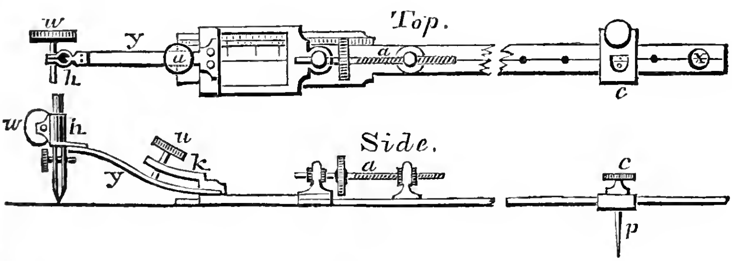
SEPTEMBER, 1835.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Description of a Beam Compass, contrived by John C. Trautwine, *of Philadelphia, Architect and Engineer.*

TO THE COMMITTEE ON PUBLICATIONS.

Having recently had occasion to draw several maps of rail-road surveys, on a large scale, I was at a loss for a beam compass, of a length sufficient for striking the curves, and, in consequence, contrived, for that purpose, the one here described.



Finding it to answer in a very satisfactory manner, and thinking it might, in the absence of a better, be useful to others, I submit it for insertion in the Journal, provided it be considered of sufficient utility.

The instrument consists of a strip of brass, (mine is three and a half feet long, half inch wide, by one twelfth inch thick,) having its edges rounded, to prevent its catching in any inequalities in the paper, and being divided and numbered into feet and inches, or in any manner that may be preferred.

Precisely in the centre line of the strip, and at each point of division, is carefully drilled a very small circular hole, entirely through the brass, and barely large enough to admit the finest sewing needle. Pains must be taken to drill these holes *precisely vertical.*

At that end of the beam where the numbering of the divisions commences, is a sliding vernier, by which the divisions may be subdivided into hundredths of an inch. This slide is moved along the end of the beam, by means of the screw, *a*, and is furnished with a holder, *h*, into which a pencil, or drawing pen, may be inserted. It has also a screw, *u*, which, by operating on the stiff piece of brass, *k*, above, and the elastic piece, *y*, below, forces the pencil, with any required degree of pressure, against the drawing. The lower piece, *y*, is elastic, that it may, by yielding, allow the pencil to play over any roughness, or knots, that the paper may contain; and is very essential to the drawing of a clear, unbroken line. *c* is a sliding piece of brass, with a point, *p*, and a semicircular hole, *o*, on top, (for seeing the dimensions on the beam.) It will often be found useful for ascertaining the centre of a circle by trial, when it is inconvenient to do so by calculation.

As the size and proportion of the parts of the slide, (particularly of the spring and pen,) are of great importance, and mine are the result of several trials, I have represented them at one-quarter the full size, to enable others to make them with certainty at the first attempt.

The drawing ink should be perfectly clean and free from dust, and of a certain degree of fluidity, which a few trials will point out.

The paper should be brushed with a clean handkerchief, to remove dust, before beginning to draw the curves.

The dimensions above stated I consider sufficient for beams six feet long, which gives a diameter of twelve feet, a size which is very rarely exceeded in neat finished drawings on paper.

For radii less than three feet in length, both the breadth and thickness of the strip may be reduced.

To use the instrument, having first found the centre from which the curve is to be described, drive a fine needle firmly and vertically into it; and over the needle, place that division hole of the beam which more nearly corresponds with the required radius; after which, bring the pencil *precisely* to the point of beginning of the curve, by means of the screw, *a;* and after giving it a proper degree of pressure on the paper, by turning the screw, *u*, describe the curve by merely pushing the beam over the paper, without any other vertical pressure than what arises from its own weight. When one line is drawn, and the pencil is to be taken back, to commence another, it may be raised from the paper, either by unscrewing *u* a little, or by slightly lifting the whole slide. It will not be necessary to lift the beam off the needle, for the purpose of altering the position of the

pencil, for drawing concentric curves, whose difference of radii does not exceed the play of the slide, as that may be done much more readily by the screw, *a*.

In this manner, any number of curves may be described from one point, without the least enlargement of the centre hole in the paper; a defect to which all other beam compasses I have ever seen, are liable. This is subject to so little spring, or irregularities of any kind, that I have, in the width of *one inch*, described *one hundred* concentric curves, *of seven feet diameter*, precisely equidistant, with as much neatness, accuracy, and clearness, as I could have drawn the same number of small ones, with a pair of common six inch dividers.

The instrument is peculiarly adapted to cases where the centre is on the same plane as the drawing, and where the beam will be supported throughout its entire length, or where it may be upheld by intermediate supports, sufficiently near each other to prevent any degree of sagging; but where it is impossible to support it between the centre and the pencil, it is not by any means to be recommended.

When the curves are finished, the needle may be easily withdrawn, either between the legs of a pair of common dividers, or between the blade and back of a penknife. A hole, x, should be made in the beam, for hanging it up.

These beams are kept ready made, for sale, by Mr. William J. Young, mathematical instrument maker, of this city.

Description of a Diving Dress, invented and used by Charles Condert, *of Brooklyn, New York.*

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—

The diving dress described in this communication, and the disaster connected with it, have been recalled to my recollection from noticing several recent patents for submarine apparatus. It appears to possess some peculiar features, and seems well calculated for small depth; no metallic or other inflexible material is used in its construction, or in connecting the two portions of it together. It is put on and off with the same facility as an ordinary dress, and, when in use, the body is in full possession of its natural flexibility of motion.

It was invented (and frequently used) by Mr. Charles Condert, a machinist, employed in a factory on the margin of the East river, in Brooklyn, opposite this city. In the docks adjoining the work-shop, he repeatedly descended in it, in from sixteen to twenty feet water. While thus engaged, in August, 1832, he fell a victim to his enterprise. The air in the reservoir had become expended, or, from some accident, (probably by his falling,) it had escaped, as the tube that conveyed the air from the reservoir to the interior of the dress, was found broken, when hauled up. He was, of course, instantly suffocated.

Like Mr. Spalding, the improver of the diving bell, he perished in

the bloom of life, at a distance from his family, and in the prosecution of his favourite pursuits. If a description of his dress be inserted in the Journal, it will probably be the only memorial of this ingenious, persevering, and unfortunate mechanic.

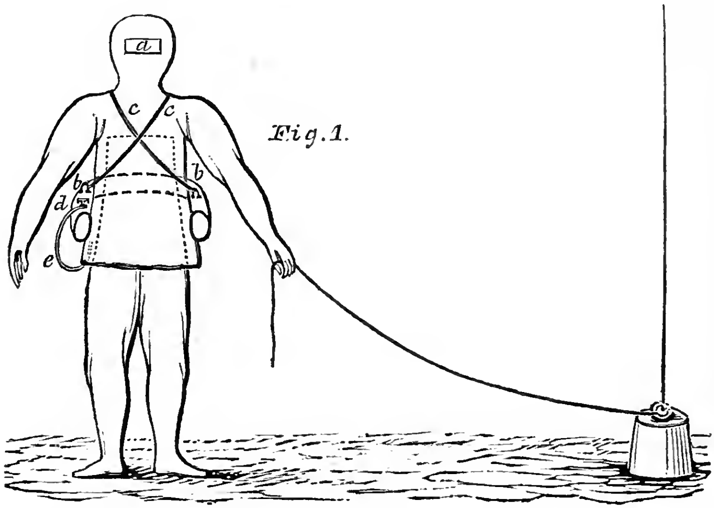


Fig. 1.

The dress consisted of two parts, made of cloth, coated with gum elastic; the under part was a pair of pantaloons, with India rubber shoes; this portion of the dress extended up to the arms, and was supported by suspenders. The other part embraced the head, arms, hands, and the body as low as the hips, descending over the pantaloons about twelve inches. A piece of glass was fixed opposite the eyes, as at *a*.

His method of obtaining a supply of air, was by condensing a sufficient quantity into a portable reservoir attached to the dress. It consisted of a copper pipe, *b b*, six inches diameter, and four feet long, closed at both ends, and bent into the form of a horse shoe. Two or three staples were soldered on the upper part, to receive hooks attached to the ends of suspenders, or slings, which supported it. Into this pipe he condensed, by a pump, (formed of a gun barrel) as much air as he supposed would be required for the time he intended to remain under water. A small valve cock, *d*, near one end of the reservoir, admitted air into the dress, when required; by opening this valve, a small pipe, *e*, from which entered two or three inches under the lower edge of the upper dress, or jacket, where it folded over the under part. The air escaping from it, of course, entered the dress, and kept it inflated, and prevented the water from entering it.

As the air was respired, it ascended to the upper part of the hood, or covering of the head, and escaped by a small aperture in the cloth, about the size of a pin's head, or less. He intended to use a

valve in its place, but found it to act tolerably well. His situation below could always be perceived by people above, from the air ascending perpendicularly over this orifice.

The round part of the reservoir embraced his back, and the two ends projected in front, on each side of him.

When he descended, by a rope passed through a hole made in the bottom of a boat, sufficiently large, (about two and a half feet square,) a fifty-six pounds weight was attached to one end, and suffered to sink to the bottom; another cord, attached to it, and one end held in his hand, or fastened to his arm, served to direct him to the perpendicular rope, when he wished to ascend.

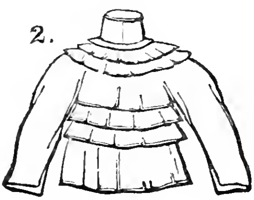
The reservoir was loaded with about 200 lbs. of lead; this load was placed too high; it would have been better to have distributed it about his legs and feet; the higher the load, the more difficult it is for the diver to rise, if he should happen to stumble, or fall.

T. E.

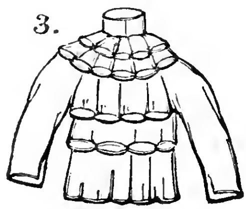
New York, June, 1835.

Note by the Author.—Might not the ordinary jacket of seamen be so constructed, that portions folding over each other might form receptacles of air, sufficient to prevent them from sinking, when, from accident or otherwise, they fall into water, as is shown at fig. 2? or perpendicular cells might be quilted on them, as at fig. 3, without materially changing the present appearance of the dress. In almost every position in which a person could fall into the water, some air would remain in these cells.

2.



3.



Replies to a Circular in relation to the Occurrence of an unusual Meteoric Display on the 13*th of November,* 1834, *addressed by the Secretary of War to the Military Posts of the United States, with other facts relating to the same question.* By A. D. Bache, Prof. of Nat. Philos. and Chem., Univ. Penn.

(Communicated by the Author.)

Having found that the inference drawn from my observations on the morning of the 13th of November, 1834,* at Philadelphia, was

* See Am. Jour. Sc. & Arts, by Prof. Silliman, for January, 1835, p. 335.

directly opposite to that to which Professor Olmsted had been led, from his observations at New Haven, I felt naturally desirous to determine what might have been the extent of country over which the unusual display of meteors seen at New Haven had taken place, this extent having a direct bearing upon the question of the nature of the phenomenon. At my request, communicated through the kindness of the Chief Engineer, the Secretary at War, Gov. Cass, issued a circular to the commandants of the different military posts of the United States, requesting to be informed whether any unusual meteoric display had been witnessed at their respective posts, on the morning of the 13th of November, 1834.

The results of this inquiry, I propose now to put upon record, in as brief a manner as possible. The arrangement adopted in the record, is to begin with the most northern post on our north-eastern frontier, to pass southward along the Atlantic board; then beginning with the most southerly post of the western chain, to pass northward along that chain, then eastward on the northern frontier, towards the original point of departure. Along this line, the display of November 13th, 1833, attracted universal attention.

From Hancock Barracks, Holton Plantation, Maine, Maj. Clarke reports that no recurrence of the meteoric phenomenon of 1833, was observed on the 13th of November, 1834.

A similar report is made by Maj. M'Clintock, in relation to Fort Preble, Portland, Maine, and its vicinity.

No unusual meteoric phenomenon was observed at Fort Constitution, Portsmouth, New Hampshire, as stated by Maj. Ansart; nor at Fort Trumbull, New London, Connecticut, as stated by Maj. Saunders; nor at Fort Hamilton, New York Harbor, according to the report of Maj. Pierce; nor at Fort Severn, Annapolis, Maryland, according to Maj. Walbach; nor at Fort Washington, Potomac river, below Washington city, according to Maj. Mason.

Maj. Churchhill states that at Fort Johnston, Smithville, North Carolina, no unusual meteoric appearances were noted on the evening referred to in the circular, but that no one was particularly engaged in watching for a recurrence of the meteors of 1833.

Maj. Gale reports from Fort Moultrie, Charleston Harbor, that he can find no one in the garrison, or its vicinity, who has seen any unusual meteoric display since November, 1833; and the report of Lt. Williamson, from Castle Pinckney, in the same harbor, is to the same effect.

Capt. Marchant makes a similar report from Fort Oglethorpe, Savannah, Georgia.

From Fort Marion, St. Augustine, East Florida, Capt. Drane reports that no recurrence of the meteors had been observed, and that no remarkable meteorological occurrence was recorded about the period designated, in November.

No recurrence of the meteors was observed at Fort Jackson, on the river Mississippi, below New Orleans, commanded by Capt. G. M. Gardiner.

General Atkinson states from Jefferson Barracks, near St. Louis,

Missouri, that no occurrence of the sort alluded to in the circular, was observed in the autumn of 1834, by "any one at the post, nor was there such a recurrence any where in the west, as far as [his] inquiries, had extended."

Lieut. Col. Vose reports from Fort Towson, on the Red river, below the mouth of the Kiameche, that no recurrence of the meteors had been observed, as far as he could learn, in the section of the country in which the post is situated.

Col. Dodge, commanding the regiment of dragoons, reports from Fort Leavenworth, on the Missouri river, at the junction of the Little Platt, that no remarkable meteoric phenomenon had occurred since his arrival at the post, on the 27th of September; he adds, that "a recurrence of an event so remarkable as the one mentioned, could not have escaped the notice of the sentinel on post."

From Fort Snelling, Falls of St. Anthony, Upper Mississippi river, Maj. Bliss reports that, from an examination of the sentinels who had been on post during the night of the 12th and 13th of November, he could not learn that any recurrence of the meteoric phenomenon of 1833 had been observed. He gives a particular account of a very bright meteor seen at 5 o'clock, A. M. on the morning of the 9th of January, 1835.

Lieut. Col. Davenport, commanding at Fort Armstrong, Rock Island, Upper Mississippi river, Illinois, states, as the result of information which is satisfactory to him, that no meteoric phenomenon was observed on the 13th of November, 1834, at his post. He gives the temperature at 7 o'clock, A. M. on the 13th of November, as 42° Fah., the wind N. E., and the weather fair.

The reports from Fort Dearborn, Chicago, Illinois, commanded by Maj. Green, and from Fort Winnebago, portage between the Fox and Ouisconsin rivers, N. W. Territory, commanded by Lieut. Col. Cutler, state that no unusual meteoric display was noticed there on the night referred to.

The return from Fort Howard, Menomoniveille, Michigan Territory, is of the same purport, General Brooke adding, that there were several apparent shocks of an earthquake in November, 1834, as evidenced "by a severe rocking of the flag-staff in the night, although it was perfectly calm at the time."

From Fort Mackinac, Straits of Michilimackinac, Michigan Territory, Capt. Clitz reports that he has "made inquiry of the sentinels who were on post on the night of the 13th of November last, and *one* only, an intelligent young man, who was posted at the north angle of the fort, saw a shower of meteors in the north, between 12 and 1 o'clock, the duration of which, as near as he can recollect, was about one hour."

Maj. Hoffman reports from Fort Gratiot, on the St. Clair river, that no recurrence of the meteoric phenomenon of 1833 was observed at his post.

The returns just given are from eleven posts in the Atlantic States, from Maine to East Florida; from six posts in the Western States, or frontier, and from five on the northern frontier; they agree in statin

with one exception, that no unusual meteoric display was noticed on the night of the 12th, 13th of November, 1834.

It is almost needless to observe, that the military stations are places where observation of any striking meteoric phenomenon may be expected, at least one sentinel being on post, the reliefs being posted by a non-commissioned officer, and the sentinels visited at least once during the night by a commissioned officer. Vigilance is particularly to be expected in our out-posts, from which the reports are quite minute. A local "shower" of meteors was observed by a sentinel at Fort Mackinac, about midnight, and lasting about one hour. Many of the reports do not confine themselves to a statement that no meteoric display was witnessed at the posts, but include inquiries made in the vicinity.

These reports may, I think, be considered conclusive against the occurrence of any extensive and remarkable display of meteors, so far as ordinary observation could have detected such a display.

In reply to letters addressed to friends in different quarters, with a view to ascertain if special observation had been made on the morning of the 13th of November, I received the following information.

At New York, as I learned from Prof. Renwick, a gentleman well known for his scientific attainments, assisted by a friend, watched during the whole night, but saw no remarkable occurrence of meteors. Doctor Gibbons, of Wilmington, Delaware, observed the heavens, in connexion with his observations on the aurora, until about half-past 12 o'clock on the morning of the 13th of November. He informs me that he has been in the habit of inspecting the heavens, frequently, every clear evening since November, 1833, and has observed, often, an unusual number of meteors, for several evenings in succession, and sometimes the reverse of this. The night of the 12th, 13th of November, 1834, was clear.

No unusual occurrence of meteors was noticed at Baltimore by the city watch, or others, to whom inquiry was directed by Prof. Ducatell; nor at the University of Virginia; nor at the University of North Carolina; at which places, as I learn from Prof. Patterson, and Prof. E. Mitchell, no special observations were made. At Cincinnati, Ohio, the night was cloudy, with showers.

President Lindsley, of Nashville University, informs me that one of the gentlemen at the University was on the look-out on the night of the 12th, 13th, but saw nothing remarkable.

The direct observations made at New York, Philadelphia, and Nashville, show that no unusual meteoric display occurred at either of these places; and the general experience at Baltimore, and Wilmington, Delaware, the University of Virginia, and the University of North Carolina, was to the same purport. As far as public testimony through the journals can reach this point, it confirms these conclusions.

I infer that the meteors seen at New Haven, from one o'clock until daylight, by Prof. Olmsted, and the gentlemen who assisted him; at West Point, after 2, A. M. by Mr. Twining; at Mackinac, between twelve and one o'clock, by the sentinel, were not parts of one me-

teoric display, visible over an extensive region of country, like the phenomenon of November, 1833, but were local.

It is to be seen from the foregoing statements, that the weather was not the same over the extent of country which they embrace, while on the 13th of November, 1833, there was a most remarkable uniformity over a much greater surface.

Philadelphia, May 28th, 1835.

FRANKLIN INSTITUTE.

Quarterly Meeting.

The forty-sixth quarterly meeting of the Institute was held at their Hall, July 16th, 1835.

THOMAS FLETCHER, Vice President, in the Chair;

CHARLES B. TREGO, Rec. Sec., P. T.

The minutes of the last quarterly, and also of the special, meeting were read and approved.

Donations of books were received from Messrs. Richard Ronaldson, Edward H. Gill, Carlos Shepard, Samuel V. Merrick, William P. Ferrand, James Harper, and A. L. Elwyn, M. D., of Philadelphia; also from Major D. B. Douglass, and T. B. Wakeman, Esq., of New York; Edwin Ruffin, Esq., of Shellbanks, Virginia; and from the clerk of the House of Representatives, Washington city, D. C.

Mr. Thomas S. Richards, of Philadelphia, presented specimens of iron ores.

The actuary laid on the table the various periodicals received in exchange for the Journal of the Institute, during the past quarter.

The forty-sixth quarterly report of the Board of Managers was read and accepted, and referred for publication.

The Treasurer presented his quarterly statement of the funds of the Institute, which was read and accepted.

Mr. J. M'Intire offered the following resolution, which was, on motion, referred to the consideration of the Standing Committee on Instruction, appointed by the Board of Managers.

Resolved, That a course of lectures on Architecture, delivered before this society, is indispensable, as well to accomplish the ends, as to promote the prosperity, of the Franklin Institute; and that it is hereby warmly recommended to the Board of Managers, to secure the delivery of such a course next winter.

(Extract from the minutes.)

THOMAS FLETCHER, *Vice President.*

CHARLES B. TREGO, *Rec. Sec. P. T.*

Forty-sixth Quarterly Report of the Board of Managers of the Franklin Institute.

The Board of Managers respectfully submit to the Institute, their forty-sixth quarterly report.

The present quarter embraces but few of the active operations of the institution; those which have been acted upon, it is, in pursuance

of the trust confided to them, the duty of the Board to present to the Society.

During the present season, the schools and lectures connected with the Institute not being in operation, the Committee on Instruction are actively engaged in devising and maturing measures for conducting them during the ensuing season, in such a manner as will tend to increase their present utility, and add to their high and merited reputation.

The Library is gradually increasing; a number of valuable works have been added during the last quarter; and the Board respectfully ask and request the attention and interest of the members to promote this, which they deem one of the most interesting and valuable objects of the Institution.

Additions have been made, during the last quarter, to the Cabinet of Models, and the committee who have charge of the Minerals belonging to the Institute, are progressing in the classification of them, the completion of which the Board confidently expect very soon to have the pleasure of announcing to the Society.

The Committee on Premiums and Exhibitions have been, for a long time, diligently and zealously engaged in their preparations for the exhibition to be held in October next; a large and efficient committee of arrangement, of members of the Institute, has been appointed, from whose prompt, punctual, and vigorous exertions, the Board confidently expect the most beneficial results. The premium list has been printed, and extensively circulated. Although this subject has been frequently alluded to, still the Board consider it their duty to impress upon the members the great necessity of an interest being taken by them in the exhibitions, inasmuch as they are of vital importance to the interests of the institution, and eminently calculated to promote and elevate the character of the mechanics, and the mechanic arts, throughout the United States.

During the past quarter, the Committee on Science and the Arts have been engaged, as usual, in the examinations of subjects brought before them by inventors. Eleven inventions and improvements were submitted, two of which have been recommended to the Board of Managers for the Scott's legacy premium, viz: for a knitting machine, invented by Messrs. M'Mullen & Hollon, of Pennsylvania, and an improved stand for reflecting telescopes, by Amasa Holcomb, of Massachusetts, which the Board have approved, and accordingly awarded.

By a resolution of the Society, passed on the 20th of June, 1835, the Board of Managers were authorized to sell the Hall of the Institute, and purchase the property owned by the Grand Lodge of the State of Pennsylvania, in Chesnut street. The necessary measures were immediately taken by the Board to carry into effect the instructions of the Society, and the report of the committee to whom the subject has been entrusted, will be communicated to the Society as soon as the object of their appointment has been effected. The ample accommodation which this eligible location affords for the operations of the Society, will be calculated to attract public attention, and give

a new impetus to the exertions of the members, which cannot fail to be attended with the most beneficial results.

The Board have great pleasure in announcing to the Society, that the list of subscribers to the Journal is rapidly increasing, and that its prospects are improving.

The monthly meetings of the institution have been well attended, and the interest in them appears to be unabated. In conformity with former usage, the Board recommend that the meetings in July and August be suspended by a resolution of the Society.

The reading room still continues to enjoy the countenance and support of the members, which the Board indulge the hope may long continue.

By the quarterly report of the treasurer, the Society will be gratified to perceive that the finances of the Institution are in a flourishing condition.

All which is submitted by order of the Board.

George Fox, *Chairman.*

William Hamilton, *Actuary.*
July 15, 1835.

Committee on Science and the Arts.

Report on Mr. William Burk's Plan for Propelling Canal Boats.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Plan for propelling Canal Boats, invented by Mr. William Burk, of White Marsh, Montgomery county, Pennsylvania, REPORT:—

That they have examined Mr. Burk's model, and find his plan to consist in the use of a spiral wheel, in the usual form, placed directly ahead of the boat, which wheel is to be put in motion by horse power, by means of an endless platform, placed lengthwise of the boat, which revolves on, and carries a horizontal wheel at each end, the forward one of which being connected by suitable wheelwork to the water wheel at the bow of the boat. This platform is a little inclined in the direction of the horse's head, the object of which is supposed to be, to obtain power by the weight of the horse as well as by his draught; in all of which the committee has discovered no novelty, unless, indeed, the application of the spiral wheel, (an old and frequently tried contrivance in almost every other mode,) at the bow of the boat, should prove to be a new place for its action, which, whether new or old, cannot be so advantageous as its present usual application at the stern of the boat, since the water which will be put in motion by Mr. Burk's wheel, will impinge on the bows of the boat, thus impeding her progress. The committee make a passing remark, that no advantage is perceived by it to arise from the inclination of the platform on which the horse is to work.

By order of the committee.

William Hamilton, *Actuary.*

April 29th, 1835.

Report on Mr. Henry Rulon's Windmill.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, the model of a Windmill, invented by Mr. Henry Rulon, of Bridgeton, New Jersey, REPORT:—

That they have carefully examined the model of the proposed mill, which was presented by Mr. Rulon without any explanation of its principles, or supposed advantages over other horizontal windmills now in common use.

It consists of a building of an octagonal form, the upper part of which is occupied with the sails, and the frame-work by which they are connected with a vertical shaft, and is enclosed by shutters, hung by cords and pulleys, in the usual way of hanging windows; the lower part of the building, which contains the mill-work, is enclosed by weather boarding, outside of which the shutters are made to slide downwards, which opens the upper portion of the building for the free admission of the wind to the sails. In the centre of the building, a vertical shaft extends from its base to the upper part of the permanent enclosure, at which point eight horizontal arms are firmly connected to the end of the shaft; these arms extend to about one-third the radii of the building, and some distance below them there is another shaft, corresponding in number and dimensions, and parallel therewith, forming together two separate sets. Vertical timbers are framed to the ends of each of these arms, each timber being connected with the corresponding arms of the upper and lower set, and extends upwards to near the height of the base of the roof, where they are connected in pairs with the ends of each one of four horizontal timbers, the latter crossing each other at the centre, parallel with the arms on the shaft; these horizontal timbers are secured to each other at the centre, where a vertical timber is attached, which turns in a box, secured to timbers thrown across the centre of the building for that purpose, thus forming an axis, by which the sails are to communicate motion to the mill, by means of four horizontal timbers, each equal in length to the interior diameter of the building, and each one of which forms arms for one pair of sails; these timbers are supported by each pair of the vertical timbers of the axis, on boxes, which admit of their turning freely, at spaces above each other equal to the width of each scale, thus forming one horizontal axis for each pair of sails, which, by turning freely, adapts itself to any required position of the same.

Each pair of sails are firmly attached to the arms of their peculiar axis, with their planes crossing each other at right angles, and extending nearly their whole width from one side of their respective arms, and in length from the ends of the arms to the upright timbers of the vertical shaft; the weight of these sails, (which are of wood,) when not acted on by the wind, will cause them to take positions, forming angles of 45° with the horizon; but, when receiving the full force of the wind, they will turn so as to expose one sail to its action,

whilst the other, standing in the plane of the horizon, will not feel its influence. The sails are maintained in the latter position by means of a weight, to which is attached two cords, which are also attached to a pulley on the axis of the sails, at such radial points of the pulley as correspond with the sails respectively.

When the sails rest in their natural positions, that is, when not acted upon by the wind, the weight rests on a support below, and its connecting cords hang slack from the pulley, and are of such length, that either becomes tight when the sail having a radial correspondence with their respective attachments to the pulley, takes a horizontal position, the acting sail being then perpendicular. When the force of the wind becomes so strong as to lift the weight, the positions of the sails will be so altered as to reduce the plane exposed to the wind of the *acting* sail, whilst the other is made to oppose its action; hence, with every degree of force in excess, the position of the sails will be altered, whilst the nett propelling force will remain the same, and is exclusively dependent on the magnitude of the weight.

The only important novelty which the committee perceive in the arrangement of this mill, is the application of weights to regulate the position of the sails on *vibrating horizontal* arms, as such weights are in common use to effect a similar object in mills where perpendicular sails, revolving horizontally, are used. A model of a mill was presented to the Franklin Institute, in the year 1827, by M. Biard, of Paris, which he denominated the Anemotope; for a report on which, see the Franklin Journal, vol. iv., page 125, (1827.) The proposed action of this model is almost identical with Mr. Rulon's, wanting, however, the proper arrangement in hanging the *vibrating* axis of the sails, to admit the useful action of regulating weights, as used by Mr. Rulon; consequently, such means of regulation were not contemplated by M. Biard; hence, to Mr. Rulon's plan must be conceded a decided preference to that of M. Biard; but whether it will prove more useful than other modifications of horizontal windmills *now in use*, cannot be ascertained with certainty without practical trial on a large scale, of which the committee deem it very worthy.

By order of the committee.

William Hamilton, *Actuary.*

June 11th, 1835.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN FEBRUARY, 1835,

With Remarks and Exemplifications, by the Editor.

1. For an improvement in the *Machine for Cutting Straw;* patented October 3, 1834; Stephen Ustick, city of Philadelphia, February 5.

We noticed this machine, as originally patented, at p. 313 of the last volume; the claim to improvement consists in "the sliding bottom,

denominated the lower feeder, and the general construction of the feeding apparatus, as described." The description, however, is by no means clear, although given at considerable length, and with a manifest intention to make it so. Perhaps we might be able to trace out its whole meaning, could we spare time enough for the purpose; but, even then, we could not transfer it to our pages without a drawing.

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2. For a *Machine for Sawing Staves,* and other cylindrical work; Hart Pepper, Southwick, Hampden county, Massachusetts, February 5.

This machine consists of a mandrel, mounted in the manner of a collar and mandrel lathe, and carrying a saw, which is represented as barrel shaped, and which must, of necessity, be of the dimensions of the vessels which the staves are intended to form; the saw, we are told, may be made of wrought iron, with cast steel teeth inserted in the cutting edge. The stuff is to be fixed upon a suitable carriage, furnished with guides of the proper form, to bring it up against the saw.

There is not any claim made, nor are there any directions given more definite than those above indicated. Saws very similar to the foregoing have been long in use, but it would be a formidable task to make one, the body of which should be sufficiently true, whilst its dimensions were equal to that of a pipe, or hogshead.

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3. For a *Reciprocating Fur Cutting Machine;* Curtis Miranda Lampson, of the city of New York, but residing in London at the time of his application; February 6.

The machine which is the subject of this patent has considerable complexity, and the description refers throughout to the drawings, which represent a machine confessedly old in most of its parts, but described and shown for the purpose of clearly exhibiting the parts claimed as improvements, which consist in the manner of applying a blade, or scraper, and of a spring which acts upon it.

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4. For a *Thrashing Machine;* Joseph Ross, Boundbrook, Somerset county, New Jersey, February 6.

(See specification.)

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5. For a machine for *Hulling Clover;* Joseph Ross, Boundbrook, Somerset county, New Jersey, February 6.

(See specification.)

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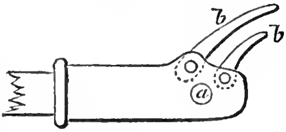
6. For an improvement in the *Windlass for Ships;* Seth Adams, city of Boston, Massachusetts, February 6.

The novelty claimed in this windlass, is the forcing it round by means of a handspike, or lever, so attached by gearing as that a similar effect shall be produced by either raising or depressing the lever.

A ratchet wheel is fixed on one end of the windlass, close to the cheek, or knight head, and a lever turning on a fulcrum, *a*, is attached to the head in such a way as to allow the palls, *b b*, to take into the teeth of the ratchet wheel, and as these work upon pins on opposite sides of the fulcrum, the desired effect is produced. The following are the words of the claim.



"I claim the arrangement of the lever and palls in the gear of the windlass, viz: putting a pall on both sides of the fulcrum; the object is, that the windlass may be put in motion both by the upward and downward movement of the lever, by which means one-half of the time required with the gear in use, is saved."

We are not aware that double palls of this description have been previously applied to ships' windlasses, although they are by no means uncommon in other machinery.

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7. For a *Cheese Press;* Rufus Porter, Belerica, Middlesex county, Massachusetts, February 6.

(See specification.)

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8. For a *Washing Machine;* Amos C. Haniford, Northfield, Merrimack county, New Hampshire, February 6.

Here is a box, or trough, within which two "feet" are to traverse backward and forward by means of a double crank shaft at one end thereof. These *feet*, so called, have cheeks, or sides, nearly triangular, and rollers extend across from one cheek to the other, excepting on that side of the triangle which slides against the bottom of the trough; at each end of the latter there is also a semi-circular row of rollers, between which and the *feet*, the clothes are to be squeezed. The cranks stand in opposite directions, and, by means of the shaft which connects them with the *feet*, one of them is worked forward, whilst the other is moved backward.

"I do not claim as my invention, any of the parts of this machine taken separately; nor do I claim the performing of the operation of washing simultaneously, this having been before effected; but what I do claim, is the general construction and arrangement of the washing parts, consisting of the two feet, and the two half circles, constructed in the manner, and operating upon the principle, hereinbefore set forth; without regard, however, to any particular dimensions or materials, or the precise form given to the respective parts."

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9. For an *Auger, or Bit;* Ezra L'Hommedieu, Saybrook, Middlesex county, Connecticut, February 11.

This patent is taken for various modes of forming the cutting edge of the twist auger; seven varieties, or modes, of forming it are described in the specification, and represented in the drawings; some of these very closely resemble such as we have already seen in use, but as the patentee is thoroughly experienced in this matter, having long been an inventor and manufacturer of such articles, we presume

that the augers and bits themselves would exhibit differences sufficiently characteristic, although they may not be very readily represented in the drawing and description. A detail of them in words would afford but little light respecting them, and would excite but little interest.

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10. For an improvement in the *Theodolite, or Surveyor's Compass;* James Eames, Newry, Oxford county, Maine, February 11.

The patentee says that, in the first place, he takes "the circumferentor, without the usual index, and forms the outside of the box so as to preserve one side straight, parallel with the north and south line under the needle in the card."

Secondly, he takes "the protractor, adding two lines, one to show the swag of the chain, the other the rise and fall of the uneven lands, attaching it to the straight side of the compass, so as to hang perpendicular."

Thirdly, he takes "the tube, or index, with prospect glasses inside of said tube, and attaches it to the compass on the outside of the protractor, in such a manner as to move round like the index of the theodolite, when placed for taking heights, &c." When the compass has been placed and leveled, the tube may be raised so as to descry the object, when, by casting the eye upon the protractor, where the first end of the tube intersects the lines thereon, the degrees, the swag of the chain, and the rise of land for a certain distance, are perceived. In descending ground, by lowering the tube, taking the object, and casting the eye upon the protractor, directly under the further end of the tube, where it intersects the lines of the protractor, the swag of the chain, and the descent of the ground, are seen. The claim is to "the above described machine, in bringing the several instruments together in my new invented way, as before described."

We have thus given a full view of the foregoing improvement, and nearly in the words of the patentee, thereby enabling those who are acquainted with the use, and the various modifications, of the theodolite, or surveyor's compass, to judge of the extent of novelty and utility in the foregoing arrangement.

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11. For an improved *Horse Rake;* Noah Briggs, New Hartford, Oneida county, New York, February 11.

(See specification.)

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12. For a *Machine for Shelling Corn;* Jonathan H. Taylor, and Aaron J. Cowley, Westfield, Chautauque county, New York, February 11.

This machine differs considerably from all those for the same purpose which we have had occasion to examine, but a full description of it would require more time and space than we are, at the present moment, disposed to afford. A cast-iron wheel, fifteen inches in diameter, is made to revolve, vertically, by means of a winch; this

wheel has spurs, or points, on each side, to aid in shelling the corn, and on its edge there are teeth, which give motion to a wheel, or pinion, on a second shaft; this second shaft carries two cast-iron wheels, one foot in diameter, embracing the main wheel, first described, between them; each of these wheels has a wide rim cast on it, which inclines inwards towards the main wheel, reducing the interior diameter to ten inches; upon these rims there are cross teeth, upon which the ears of corn are fed, being made to run down two inclined troughs, or hoppers, when, by the combined motion of the main and secondary wheels, the ears are made to revolve, and the grain is shelled off.

So far as the drawing and description enable us to judge of the operation of this machine, we are disposed to form a very favourable opinion of it; we think that it is ingeniously contrived, and has sufficient originality.

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13. For an improvement in the *Art or Mode of Ploughing;* David Ghormley, Ware, Fayette county, Ohio, February 13.

This patent is for ploughing with a double shovel plough, so made that one shovel may act on each side of a row of corn. Two oxen, or horses, are to be employed, by which it is said that one man will be able to do the work of two. The shovels, or shears, are fixed upon separate timbers, allowing the corn, &c. to pass between them. There is a drawing given of the plough, but, according to the terms used in the specification, this is not patented, the novelty, if any, being in "the *art* or *mode* of ploughing," and not in the instrument.

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14. For an *Apparatus for Scalding Hogs;* Thomas J. Godman, city of Baltimore, February 13.

A tub to contain water, and sufficiently large to allow of the hog to be scalded being immersed in it, is sunk into the ground, so as to stand at a convenient height above it. A boiler, such as is used for generating steam, is fixed in any suitable manner, and a tube from the top of this boiler leads to the bottom of the tub, for the purpose of conducting steam into the water. A second tub, or reservoir for cold water, is placed in some convenient and elevated situation, between the scalding tub and the boiler. From this tub, which is to be kept filled with water, a tube leads into the boiler, to supply its waste, and into the scalding tub, to keep it sufficiently full, and also to regulate the temperature. Each of the tubes is furnished with a stop cock.

The claim is to "the introduction of a steam and a water pipe into the scalding tub, used in connexion with an ordinary boiler for generating steam, for the purpose, and in the manner, herein set forth and described."

The heating of water in boilers and vats, by means of steam, and the supplying of such boilers and vats with water by tubes and cocks, and also the supplying of water to a boiler in the same way, are processes so well known, that we should much doubt the validity of a

patent standing on the basis of that before us. Were there any thing new, and special, in the arrangement, the case would be different; but this we do not find, either in the description, or the claim.

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15. For a combined *Cooking Furnace and Bake-oven;* Charles E. Russell, city of Philadelphia, February 13.

The fireplace of this apparatus consists of a round stove, or furnace, made in the usual manner. Around this are to be placed boilers, which may also be cylindrical, excepting on the side that is to be in contact with the stove, which is made concave, so as to fit it; two or three of these boilers may stand on a lap, surrounding the lower part of the stove. An oven surmounts the stove, which may be quadrangular, and have an arched top; it is furnished with a circular rim that fits on to the top of the stove, and a flat flue runs up at the back of it, conducting the heated air into a space formed by making the top of the oven double. A partition divides this space into two parts, and the hot air having an exit opening at each end of the hollow top, escapes in both directions. The boilers are provided with tubes, the closed ends of which pass into the fire, through openings in the stove.

The claim is, to "the general arrangement and combination of these parts, so as to form an instrument substantially the same with that described; various minor alterations may be made, whilst the general principle remains unchanged."

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16. For a *Plough;* Nathan Robinson, Sackett's Harbor, Jefferson county, New York, February 13.

(See specification.)

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17. For a *Revolving Brad Cutting Machine;* Asa B. Woods, and Ebenezer Talbot, Jr., Windsor, Hartford county, Connecticut, February 13.

The different parts of this machine are very well represented and described, but the points claimed are, principally, independent of the instrument itself, as will presently appear. The cutter wheel is to be of iron, about a foot in diameter, and is to revolve on a stout, horizontal shaft. On opposite points of the periphery of this wheel, are to be placed cutters, which consist of steel let into grooves, and regulated by screws. A bed piece, making part of a stout cast-iron frame, is to support the fixed or stationary cutter. Upon the same shaft with the cutter wheel, there is a cam wheel, intended to vibrate the strip of metal to be cut, there being a connexion from it for that purpose. In front of the cutting frame there are feeding rollers, to cause the strip to advance with the proper speed.

The claims made are as follows: "First. The application of a furnace, or fire, in any way, to brad cutting machines, to heat the plate as it passes into the machine to be cut."

"Secondly. The joining of the plates to be cut into brads, so that the machine can operate for a longer time, and also to save the remnants usually made in working short plates.

"Thirdly. The general arrangement of the various parts of the machine, as set forth in the above specification, applied to a revolving brad cutter."

It may seem passing strange, but it is nevertheless true, that, although the apparatus generally is very fully described, we do not find any mention of "the application of a furnace," except being told that a furnace is to be supported between the two frames, in a line with the grooves below them. And the same is the fact as regards the second item, there not being a word concerning "the joining of the plates," although we are told that "beyond the feeding rollers, a windlass, or reel, is to be secured, near the bottom of the frame." What is claimed, therefore, is not described, and what is described, is not claimed. The latter we think it was best to omit, and are convinced that untenable ground has been taken in presenting as new, "the general arrangement of the various parts," as revolving cutting machines, very similar in construction, have been repeatedly essayed.

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18. For a *Cotton Planting Machine;* Michael Beam, Buffaloe, Lincoln county, North Carolina, February 13.

This machine has a general resemblance to several others employed for planting seeds, but differs from them in some of its particular arrangements. It is to be drawn along in the manner of a cart; the seed is to be placed in a barrel, which is made to revolve by the wheels on either side, holes being made in the barrel to drop the seeds in the right quantity, and these are conducted down a trough into a furrow made by a coulter on the front bar of the frame. Scrapers for covering the seeds are placed in the rear, and are made capable of adjustment, so that, if required, they may form a ridge of earth over the seed. The particular parts claimed we shall not specify, as some of them would not be well understood without the drawing.

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19. For a *Corn Sheller;* Adna L. Norcross, and Ephraim Rand, Hallowell, Kennebec county, Maine, February 13.

Excepting in trifling points, relating to matters of arrangement merely, this machine is exactly like the first patented corn shelling machine, the patent for which expired many years ago. A cylinder set with teeth, is to have a concave borne up against it by springs, to adapt it to ears of different sizes. A claim is made to the guard, springs, and apron; to the manner in which the teeth are set, and to the general form and arrangement of the whole. It is no easy task to tell what is meant by some of the parts above named, as the drawing is altogether unworthy of the name.

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20. For an improvement in *Backs for Blacksmiths' Forges;* Isaac Sawyer, Hallowell, Kennebec county, Maine, February 13.

About two or three years ago, several patents were granted for forge backs of cast-iron, which backs were hollow boxes, into which the wind was to be blown, whence it was to proceed through a tuyere, or opening, into the fire. The one now patented differs but little from some of those alluded to, excepting in the material used in making some part of it; the front plate, or that with which the fire is in contact, and the conductor through which the wind passes, are to be of a mixed metal, consisting of copper, zinc, lead, and tin, in the proportion of eight pounds of copper, one pound of zinc, half a pound of lead, and two ounces of tin, or of any other similar composition in which copper is the main ingredient. The claim is to the making the parts named of the foregoing composition, and the forming of the box in separate parts. The latter has been before done, and the plan is patented; the former is of more than doubtful utility, as it will rob the fire of a larger portion of its heat than a back of cast-iron, being a better conductor; and it will, when heated, be much more brittle than iron.

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21. For a *Brick Striker;* Peleg Sweet, Ashtabula, county of Ashtabula, Ohio, February 20.

The drawing, which is referred to through the whole description of this machine, is so imperfect, as to afford a very inadequate idea of its construction and mode of operation, and we shall not attempt to decypher it. The claim is, "exclusively the discovery of properly confining and supplying the mortar, properly placing the moulds, and forcing the mortar into the moulds by the immediate action of the propeller, so as to leave no brick imperfect. The operation of the machine is rapid, sure to produce perfect bricks, and is the best labour saving machine for the purpose within his knowledge."

This claim is altogether defective, as it refers to the thing done, instead of to the means, or machinery, by which it is effected.

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22. For an improvement in the *Machinery for Manufacturing Paper;* John Ames, Springfield, Hampden county, Massachusetts, February 20.

This patent is taken for the manner of applying a drying cylinder to machines for manufacturing paper. Those acquainted with these machines, know that the paper, after passing through the press rollers, is subjected to the action of large hollow cylinders, by passing over which it is effectually dried, these cylinders being heated by steam, or hot air, which passes into them through a hollow gudgeon. The patentee substitutes the drying cylinder for the upper press roller; these cylinders are, in preference, made of cast-iron, and from nine to twelve feet in diameter; the lower press roller is to be borne up against the cylinder by means of weighted levers, with such force as to cause the drying cylinder to revolve.

The claim is, to "the use and application of the said cylinder, as a substitute for said upper and main press roller, in the machines which have heretofore been in use for making paper, and in the con-

nexion and combination with the said lower press roller, or rollers, in the manner, and for the use and purposes, aforesaid."

23. For the *Application of Hydraulic or American Cement, to the Construction of Tanning Vats, &c.;* John C. Johnston, Cattskill, Greene county, New York, February 20.

This patent is taken for "an improvement in the application of hydraulic, or American, cement to the construction of tanning vats and leaches; malsters' and brewers' vats, or reservoirs; reservoirs and vats necessary to distillers; also, vats and reservoirs for manufacturers of sugar and molasses; also, for the application of hydraulic, or American, cement to the manufacture of circular and square brick, or blocks, of the above mentioned cement, of any required size, or form, for all the various uses of building or architecture; also, for the application of the above cement to the forming of brick, or blocks, open or solid, fluted and plain, for the construction of columns, or pilasters; also, for the application of the above cement to the moulding, or forming, of arches for doors and windows; also, for forming window sills, or lintels; also, for forming door sills."

About the preparation of the cement, no information whatever is communicated, but we are left at perfect liberty to apply to what quarry we please for water lime, and to mix it according to our own knowledge or ignorance upon the subject. The directions for forming the blocks, and those for building with them, are altogether meagre, and the claims made are "only the application of the cement to the manufacture of the brick, or sections, to be used in the construction of the cistern, or other circular work; and the manufacture of the brick, or block, for the purposes of architecture." How many claimants there are to this discovery, we know not; but this we know, that the same thing has been long in use, and that columns, and plain and ornamental blocks, for architectural purposes, statues, and a countless number of other things to which it is applicable, are daily made of cement in England; it has also been employed in this country; the arms and other ornaments in front of the Arcade, in Philadelphia, were made of cement, by Mr. Gevelot; he, however, used *English* cement, as the American was not then well prepared. How long it is since artificial stones were made, we are unable to say, but it has been contended that the pyramids of Egypt are of this character; without, however, subscribing to this opinion, and dating the invention back to the period when old Time himself was a stripling, enough has been said to show that artificial stones made of cement are not things of yesterday.

24. For a *Rotary Steam Engine;* George M. Alsop, city of Philadelphia, February 20.

The patentee claims "in this engine, the peculiar arrangement and construction, taken as a whole, and not its several parts taken individually, except the arrangement and construction of the piston cylinder, so as to adapt it to any wear that may take place; and also

the arrangement of the valve cylinder and shifting stops, or slides." The application of an engine, similarly coustructed, as a water power engine, is also claimed.

The variations of this engine from some others of the rotary kind, manifest considerable ingenuity, but still leave the general principle of action the same with certain of its predecessors, offering nothing which appears to us likely to obviate the objections which have prevented their continued use.

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25. For a *Composition for rendering Roofs Water-proof, &c.;* Lyman Garfield, Troy, Rensselaer county, New York, February 20.

The composition spoken of is to be used "for the purpose of making the roofs of buildings water-proof; for lining floors, walls, aqueducts, and vessels for holding or passing water, and for cementing the parts of vessels; also for making door and window caps, and sills, where free-stone is now used; also to any wood-work, to prevent leaks, and the lining of baths, sinks, and water spouts; and for making stoves, fireplaces, furnaces, jambs, and mantel pieces; by uniting sand, water lime, ashes, the earths, or alkalies, clay, oil, and copal varnish, with or without dissolved India rubber, or caoutchouc."

The foregoing quotation is from the petition, and refers to so many things, that we were led to anticipate, in the specification, a voluminous description of the processes necessary to carry the whole into operation; this, however, we have found to be vague and indefinite, as will appear from the epitome which we are about to furnish.

To make roofs water-proof, we are directed to "dissolve caoutchouc in spirits of turpentine, or seneca oil, and then evaporate the turpentine, or seneca oil, by alcohol, so as to form a paste," which is to be spread upon the roof by any suitable instrument; sand, water lime, and coal ashes, in equal parts, are then to be sifted over it, (or sand, ashes, and earth, may be used,) and pressed down; or the whole materials are to be mixed to the consistence of mortar, and spread by means of a trowel. Parts of buildings, or vessels, decks and awnings, whether of wood or cloth, are to be treated in the same way.

To the dissolved India rubber may be added, "any of the earths, or alkalies, whether silicious or otherwise, or anthracite coal ashes, or wood ashes, or water lime, or the combination of any or all of these." Or the following composition is to be used for the same purpose: "equal parts of sand and ashes, anthracite coal ashes being preferred; mix with oil and copal varnish, about one-fourth copal varnish, or some other varnish, of a hardening quality. The sand and ashes must be mixed soft enough to enable the operator to spread it upon the roof with a trowel."

Water lime, sand, and anthracite coal ashes, are to be employed for making window and door caps, sills, sinks, pipes, &c.; sand, or gravel, or sand and coal ashes, from one to ten parts, to one part of

water lime. For resisting fire, a small portion of pipe, or other, clay may be added.

The patentee has not made any claim, or told us in what the novelty of his plan consists; nor, from the tenor of his remarks, should we suppose that he has made any adequate trials of his own prescriptions, if such they may be called, when given in terms so loose and indefinite. His first composition has a basis of India rubber, whilst in his other, this substance is not used at all; his patent, therefore, is for things entirely dissimilar, and distinct from each other, and these, if valuable, ought, therefore, to have been made the subjects of separate patents.

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26. For an *Air Pump for Extracting Foul Air from Ships, &c.;* James Barron, United States Navy, city of Philadelphia, February 20.

In the number of this journal for June, 1828, we published some extracts from, and remarks on, a pamphlet from the pen of Commodore Barron, "On the Causes of Dry Rot," which contained a description of the bellows used by him for ventilating the holds of ships, and which were constructed like the common smiths' bellows, having a tube leading from the valve hole on the lower board, into the hold of the vessel. However good the thing may be, and we have no doubt of its utility, it is public property, not being new to the public. This is a principle which was fully settled in the case of Sellers & Pennock *v.* Dialogue, see vol. iii., p. 184. "The true construction of the act is, that the first inventor cannot acquire a good title to a patent, if he suffers the thing invented to go into public use before he makes application for a patent."

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27. For an improvement in the *Percussion Gun Lock;* Robert Beale, city of Washington, District of Columbia, February 20.

This percussion lock is intended for fowling pieces, &c., and the things claimed as improvements are, "the form and simplicity of the lock, it having but one spring in the plate; but what I principally claim, is my movable percussion key, or hammer, which, when the gun is not in immediate use, may be in an instant removed, and rendered perfectly harmless." A proper description of the proposed arrangements would require the drawing.

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28. For an improved mode of constructing a *Mill Bush, or Spindle Box, and a Ring and Ball for the Stones of Flour Mills;* Warren P. Wing, Greenwich, Hampstead county, Massachusetts, February 20.

(See specification.)

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29. For a *Plough;* Benjamin Johnson, Hickory Grove, Bond county, Illinois, February 20.

There are three things mentioned as improvements on the common

Carey, or Bull, plough; two of them refer to the manner of forming the wood work of the plough, and the attaching the parts together; the third relates to the construction of the mould board, which is to be formed into three parallel ribs, behind the wing, which ribs may be from one to two and a half inches wide, and have spaces of corresponding width between them. The advantages of this improvement are said to be, "that the draft is rendered much lighter in consequence of there being less friction, the spaces between the ribs preventing that clogging, and accumulation of earth and soil, common to the mould board; and that all or any part of the ribs can be taken off at pleasure, and a heavy plough made light, according to the work to be performed."

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33. For a *Percussion Lock;* Thomas Daplyn, Dover, Wayne county, Ohio, February 20.

The lock here patented is so constructed, that it can be removed instantaneously from the stock. For this purpose, all its acting parts are contained within a thin case, which drops into a mortise made through the stock, the hammer projecting above, and the trigger below, the case. By pressing the thumb upon a catch, the lock is released, and may be carried in the pocket; when wanted for use, it is merely dropped into the mortise. The lock appears to be well constructed, its parts being so arranged as to adapt it to the form given to it, without interfering with its operation. The claims are to "the manner of inserting the lock in the stock," and to "the manner of construction, or the mode of putting the lock together, in all its parts."

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31. For *Scoop Shovels, and Machinery for manufacturing them;* John and William Smith, Williamstown, Berkshire county, Massachusetts, February 25.

The claims made "as original, is a sheet iron scoop shovel, with a circular or spherical end, moulded into form without cutting the sides. Also the rotary shears, in their adaptation to general purposes. Also the application of the principle of a falling die to the specific purpose of forming shovels."

The particular form given to the shovels is described in the specification, but is not represented in the drawing, and as we have not seen it, we venture to hope that there is more novelty in this, than in the "machinery for manufacturing the same," which consists of the common revolving shears, or cutters, for cutting the metal, and the common drop-press, furnished with dies to give it the intended form.

The claim to the application of these well known instruments to the making of shovels, is about as rational as it is valid, and as novel as would be the claim of the *application* of a cast-iron hammer to the cracking of hickory nuts.

32. For an improvement in the mode of *Using Chains, or Ropes, for the purpose of drawing Cars on Inclined Planes;* John M. Palisse, and Sydney S. Durfee, Hudson, Columbia county, New York, February 25.

"The chain, or rope, after passing over the power wheel at the summit of the plane, and from which it receives motion, is reeved over pulleys attached to the cars, or other vehicles, to be drawn, and the ends of the said rope, or chain, made fast to windlasses, or any other contrivance, placed at, or near, the summit of the plane, for the purpose of obviating the elongation or contraction of the chain, but more particularly of the rope, if the latter is used.

"The advantage obtained by thus reeving the rope, or chain, on pulleys attached to the cars, or other vehicles, is, that part of the weight to be drawn being thrown on the stationary fastenings, or windlasses, at the head of the plane, an amount of leverage power is obtained, whereby the driving machinery, and, consequently, the rope, or chain, moved by it, are relieved of nearly one-half of the strain they bear, when used in the ordinary way."

The claims made are, "to the reeving the rope, or chain, on pulleys attached to the cars, or vehicles, used on the inclined planes of rail-roads and canals; also, the pulleys themselves, without distinction of shape, size, or material, when so attached to the cars, or other vehicles, as above, for the purpose of draft. To the windlasses, or any other sufficient contrivance, placed at or near the head or summit of the plane, for the purpose of securing the ends of the rope, or chain, and obviating the elongation or contraction of the chain, but more particularly of the rope, when the latter is used."

We have thus given the whole sum and substance of this specification, and it will be seen that the invention amounts to the raising of the load by a tackle, having a single movable pulley, which movable pulley is claimed, and must, of course, make a part of the invention, or discovery, of the patentees, who also claim, virtually, all methods, or contrivances, by which the end of the rope is to be fastened at the summit of the plane. To the discovery that the strain upon the rope is lessened "*nearly* one-half," should have been added that the load also will be raised with but one-half the velocity, when this well known contrivance is applied.

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33. For a *Cooking Stove;* Paul Wing, Grafton, Massachusetts, February 25.

There is certainly but little to claim in this stove, and but little is claimed. After describing parts which belong to a large portion of the different kinds of cooking and heating stoves now in use, and informing us that a tin kitchen is to be adapted to it, we are further told that "The front part of the kitchen, which is a part added to the kitchen now used for baking, is added to make it connect with the stove; and all I claim as my improvement, is the part thus added to the kitchen, and the application of it to the stove for the purpose

of cooking." That is, the making the kitchen in such shape as to fit against the stove in question, is the thing patented.

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34. For a *Machine for Cutting Meat;* John Morris, Derby, New Haven county, Connecticut, February 25.

This machine is not intended to cut meat in the manner of the ordinary sausage meat cutters, into minute particles, but into longitudinal shreds. The meat, separated from the bones, is to be put into a cylindrical vessel, or hopper, and a knife, of a peculiar construction, revolving horizontally, divides, or cuts, it into plates, whilst others, which are short, descending vertically, divide it into strips. We cannot attempt to give the construction and operation of the machine in detail, these occupying half a dozen pages in the specification. The patentee enumerates advantages in his machine, some of which appear to us to be overrated. He says that, "among those obvious, are the rendering soft and tender the parts of the flesh of animals naturally hard, and difficult of mastication. The preserving all the juices entire, and thereby avoiding the waste of them incident to the most common modes of preserving and preparing it for food, and thus retaining unexpended the peculiar flavour of each kind. And the facility of applying instantly, at all seasons, to each minute part of it, the means of preservation and seasoning, without incurring the danger of putrefaction consequent on the slow action of those means upon large masses, in the present mode of curing them."

We do not believe that our housewives, or epicures, will consent to have our hams and rounds of beef cut into shreds, and thus salted and served up, instead of having them presented in all their native beauty of form, exhibiting their well arranged layers of fat, and layers of lean, with which the idea of their excellence is so intimately associated.

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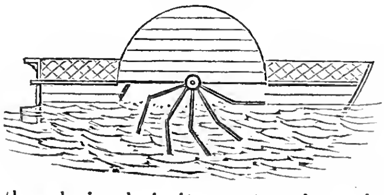
35. For *Propelling Wheels for Steamboats;* Nehemiah Dodge, city of New York, February 25.

The patentee calls his wheel, "The continual draught buoyant wheel." Much pains has been taken to cause the paddles of wheels to descend vertically into, and rise vertically from, the water, and we have here arrived at the mode of accomplishing the latter, without any difficulty whatever; as a set off, however, we are compelled to say, that it will be adopted without any advantages, and, according to our conceptions of the affair, with results, in some points, entirely the reverse of those anticipated by the inventor.



"The wheel is to be constructed like the ordinary paddle wheel, with the exception of the position of the floats, which, instead of standing in the direction of radii thereto, are to incline forward to an angle of 45 degrees." We are told that "this wheel, though simple in its construction, when attached to a steamboat under

way, will actually buoy up the boat, and as the blades recede from the water, there will not be that resistance which the common steamboat wheel is obliged to contend with; consequently, a steamboat constructed with wheels after the *model*, must pass through the water with much greater velocity. The speed of the boat can also be checked by wheels constructed after this manner, much sooner than by the common wheels, as the natural tendency of a backward motion in these is to draw the boat down in the water." We would advise the patentee to inquire into the advantage which would result from carrying out his principle to a greater extent, by placing his floats at an angle of ninety degrees with the radiating timbers.

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36. For a *Mortising Machine;* Grove Bradley, Auburn, Cayuga county, New York, February 25.

The nature of this machine is such as to require several figures in the drawing, in order to show the particular arrangement of those parts which are relied on as novel. The claim made to these would not, therefore, be understood from mere description, or, at all events, not without making it more elaborate than the nature of the subject would warrant.

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37. For a *Machine for Washing Potatoes, and other Roots;* William Ellis, Waterville, Kennebeck county, Maine, February 25.

The potatoes are placed in a cylindrical receptacle, the periphery of which is formed of slats, or rounds, and which is made to revolve in a trough containing water. A claim is made to "the application and construction of the cylinder, as set forth; and the adapting the trough beneath it to the use also as set forth."

Clothes have been washed in such machines, and no one will doubt that roots also may be cleaned by its agency. A patent, however, to give an exclusive right to that which has no novelty in its construction, will be pretty certain to be told out, should it make its appearance in a court of law.

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38. For *Branding and Stamping Apparatus;* Elijah Barnes, Gustavus Hills, and Ira B. Hawkins, Ashtabula, Ashtabula county, Ohio, February 25.

Movable letters, or types, are to be fixed in a stock, or case, much in the manner of those for marking linen, but a lip, or projection, is to be formed on the type, to prevent their falling out of the stock, when partially loose. "The whole claimed as our invention, and to be used either cold or hot for the purposes of branding, stamping, marking, labeling, printing, &c., with letters, figures, characters, &c."

May the book-binders, &c., use their movable types, as they have heretofore been in the habit of doing? Perhaps so, as there is no lip to keep them from falling out of the stock, or case.

Specifications of American Patents.

Specification of a Patent for a Machine for Thrashing Grain. Granted to Joseph Ross, *of Boundbrook, Somerset county, New Jersey, February 6th,* 1835.

To all whom it may concern, be it known, that I, Joseph Ross, of Boundbrook, in the county of Somerset, and State of New Jersey, did, on the 12th day of April, 1833, obtain letters patent of the United States, for a machine for shelling corn, and that I have since discovered that, by certain improvements, or variations therein, I can adapt the same to the thrashing of grain. My said improvement, however, being capable of being used as a thrashing machine, by applying the cylindrical body and concave herein described to any suitable frame, other than that used with my shelling machine; the only motive for combining the two being the saving of expense.

I make that part which is usually denominated the cylinder in thrashing machines, smaller in the middle than at the two ends, so that, instead of being a cylinder, it is, in fact, formed by the union of two truncated cones, at their smaller ends. The difference of diameter between the middle and ends may be about one inch; I prefer not to make the difference greater, as I can then use a concave, which is straight longitudinally, whilst, if the cylindrical part was made much smaller in the middle, it would be necessary to make the concave conform thereto, by giving it a rise in the centre; but I usually make the teeth driven into the cylinder to vary in length, so that their outer ends will, in revolving, pass each at the same distance from the concave.

I drive teeth into the cylindrical body, which teeth project from an inch to an inch and a half, and also drive similar teeth into the concave; these teeth may be of square three-eighths iron. I do not drive them straight, but incline them in both, in such a way as shall tend to prevent their breaking the straw, their slope separating them readily therefrom.

I usually cover the cylinder and concave with sheet iron, as this tends to render them the more durable.

In the frame of my shelling machine, this cylinder and concave may be substituted for the shelling apparatus, so that the one or the other may be used at pleasure; or I place this cylinder and concave in a suitable frame, without reference to the shelling machine; in either case, a proper feeding table, or any other well known contrivance for that purpose, may be used. The only thing which I claim as new, is the form given to what is usually denominated the cylinder, by making it smaller at the centre than at the ends, as herein described, the effect of which, it has been experimentally proved, is to prevent that annoyance from the current of wind and dust, produced in other machines for thrashing grain.

Although I have spoken of the revolving body as formed by the union of two truncated cones, the effect will be similar if, instead of

using the double cone, as described, the cylinder be made concave, in a regular curve, reducing its diameter in the middle, so that it shall be an inch, or upwards, less there than at the two ends.

JOSEPH ROSS.

Specification of a Patent for a Machine for Cleaning Clover, and other Seeds. Granted to JOSEPH ROSS, *Boundbrook, Somerset county, New Jersey, February 6th,* 1835.

To all whom it may concern, be it known, that I, Joseph Ross, of Boundbrook, in the county of Somerset, and State of New Jersey, have invented a new and improved machine for the purpose of rubbing out and cleaning clover, and other seeds, and that the following is a full and exact description thereof.

I construct a frame to sustain a horizontal cylinder, and other parts of the apparatus, to be presently described. The cylinder may vary in length and diameter, according to the power by which it is to be driven. The cylinder is to be set with teeth of two kinds; one set of teeth may be from one-fourth to half an inch in length. These form circles round the cylinder, the circles being an inch, more or less, apart. Between these, rows of longer teeth, wires, or sprigs, are driven, which should not stand out more than one-sixteenth of an inch, their office being to rub the seed from the husk; a similar effect may be produced by covering the cylinder with punched sheet iron, or in other well known ways.

I use a concave which surrounds the cylinder for about three-quarters of its circumference. The part directly under the cylinder, extending about one-quarter of its circumference, may be of punched sheet iron, or of wove wire, with meshes of such size as will allow the seed, but not the chaff, to pass through. The remaining part of the concave, extending up to the apex of the cylinders, may be left smooth. The distance between the cylinder and the concave must be sufficient for the passage of the larger teeth.

The seed to be hulled is put into a hopper above the cylinder, the opening through the bottom thereof extending the whole length of the cylinder. In front of the cylinder I employ rubbers, which are made by taking wide strips of sole leather, the length of the cylinder, there being three, four, or more, such strips; these I confine between pieces of thin board, one piece being placed between each strip. The edge of the leather, where it touches the cylinder, projects beyond the thin boards, so as to give it the necessary play; each piece of leather is so notched as to allow the longer teeth to pass. The leather rubber, thus formed, slides in against the cylinder, and is, therefore, capable of being adjusted so as to press against it with greater, or less, force.

When the seed has passed the leather rubbers, the greater part of it falls through an opening on to the floor, whilst the chaff and the remaining seed, are, by the action of the longer teeth, carried imme-

diately over the perforated iron, or the meshes of wire work, of which the lower part of the concave is formed.

At the point where the smooth part of the concave commences, an opening may be made by lowering the bottom part of the concave, which is hinged in front for that purpose. Stones, or other hard substances, may be thus readily removed. A strip of leather is fixed along the edge of this opening, which extends to the cylinder, serving to check the too free passage of the seed round with the chaff, whilst, by its elasticity, it will allow the long teeth to carry the chaff beyond it. The back edge of the hopper has also a similar piece of leather upon it, which extends to the cylinder, and arrests the chaff, causing it to be blown out through an opening immediately behind the hopper, whilst that which contains seed, will, from its greater weight, be retained, and pass the leather, to be again rubbed.

What I claim as new in the foregoing machine, is the combination of long and short teeth in the cylinder, operating in the manner, and for the purposes, set forth. I also claim the leather rubber, constructed and acting in the manner described; not intending, by these claims, to limit myself to the precise arrangement set forth, but to vary the same in any way, whilst I produce the same effects by machinery operating substantially upon the same principle.

JOSEPH ROSS.

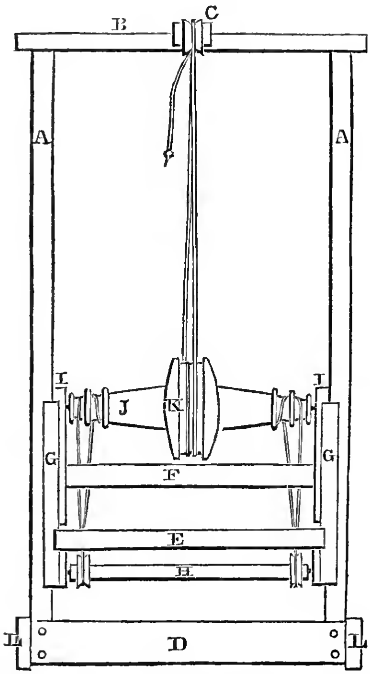
Specification of a Patent for a Self-adjusting Cheese Press. Granted to RUFUS PORTER, *Belerica, Middlesex county, Massachusetts, February 6th,* 1835.

Two posts, five feet long, four inches wide, and two inches thick, are placed parallel to each other, two feet apart, and having a cap piece across the top; and two pieces of plank, twenty-eight inches long, and six inches wide, are nailed to the bottoms, crossing from one to the other; and two other pieces, eighteen inches long, are nailed to each post, crossing at right angles with the first, and by which the posts are supported in an upright position; two planks, one of them ten, and the other six inches wide, extend horizontally from one post to the other, and constitute the bed and follower of the press. These are not attached to the posts, but the ends of the bed plank are attached by tenons, or nails, to four vertical sliding guides, two at each end, one of which is placed on each side of each post. These sliding guides are sixteen inches long, extending two inches below, and twelve inches above, the plank, which is also further supported by two cleats, one of which passes beneath each end of the plank, and is secured to the guides. A small shaft, having a gudgeon on pivots at each end, and a pulley three inches in diameter near each end, extends from one cleat to the other, under the centre of the plank. The ends of the follower plank, which is placed about six inches above the bed plank, are attached to two vertical, sliding planks, which are ten inches long, and four inches wide; being guided, or kept in place, by the four sliding guides, the two pairs of

which are an inch less distant than the two posts. Another shaft crosses above the follower, having gudgeons, or pivots, which enter the sliding planks. This shaft has a pulley, or grooved wheel, on its centre, of nine inches diameter, a groove at each end, of two inches diameter, and other two grooves, near the first, of three inches diameter. Two small ropes are made fast to the shaft within the two small grooves, and proceed thence downward through both planks, under the pulleys, and thence upward to the larger grooves, passing twice round the shaft, and are then made fast. Another cord extends from the cap piece downward, twice round the large pulley, thence upward over a small pulley which is attached to the cap, the end of the cord being at liberty. By this cord, the press planks, &c. are drawn upward, by which process the ropes are given off from the larger grooves, and are taken up by the smaller; the planks are thus permitted to separate, and a cheese may be placed between them, when, if permitted to descend, the press planks will approach each other, and produce a pressure equal to eighteen times the weight of the cheese to be thus pressed.

Front view of R. Porter's Cheese Press.

A A, posts.
B, cap.
C, small pulley.
D, bottom cross planks, or sills.
E, bed plank.
F, follower.
G G, sliding guides.
H, small shaft.
I I, sliding planks.
J, large shaft.
K, large pulley, or groove wheel.
L L, ends of the cross planks.



I claim as original the arrangement of the pressing planks, guides, shafts, and pulleys; and the application to the pressing of cheese, of

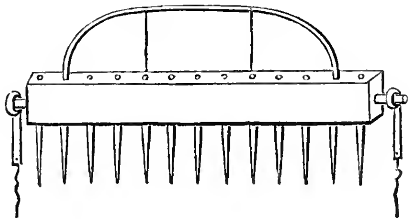
the principle whereby pressure is produced, by giving off a rope from a smaller part of a shaft, at the same time that it is taken up by a larger part.

RUFUS PORTER.

Specification of a Patent for an improved Horse Rake. Granted to NOAH BRIGGS, *New Hartford, Oneida county, New York, February 11th,* 1835.

To all to whom these presents shall come, Noah Briggs, of the town of New Hartford, in the county of Oneida, and state of New York, sends greeting:

Be it known, that I, this said Noah Briggs, have invented a new and useful improvement, not known or used before my invention, in the gathering of hay and grain, which I denominate an improved horse rake, the construction of which, and the manner of using it, are specified and described as follows, viz:



It is made of wood, and consists, 1st, of a head, which is composed of a head piece, or main shaft, twelve feet long, and three by four inches in size, having fourteen tapering teeth, each two feet long, inserted at one end into one of the narrow sides of the head piece, at equal distances, through mortises two inches long, and one inch wide.

2dly, of a round handle two inches through, in the form of a half ellipsis, sprung into the head piece eighteen inches from each end, and rising in the middle two feet three inches, having its plane at right angles with the teeth, and having two, or more, cords stretched from it to the head piece, at right angles with the same, and made fast at each end, dividing the plane of the handle into equal spaces on its longest diameter, or head piece side.

3dly, of two arms, each two feet long, and four inches by two in size, connected, at one end, with one end of the head piece, by means of an axle, or gudgeon, an inch and three-fourths through, passing through a two inch auger hole in the arm, having its lower side on a line with the handle side of the head piece, and projecting beyond the end of the head piece far enough to receive the arm, and admit a small half inch pin outside it, to hold it on; such angles, or gudgeons, moving freely in the arms, and being made fast to the head piece by pins, or gripes, or both. The head piece should be of light timber, not liable

to spring, or warp; and the teeth, handle arms, and gudgeons, should be of strong, hard timber.

This rake may be used for gathering hay into winrows, and into cocks, or bunches; also for gathering grain of most kinds into bundles, or bunches; and the manner of using it is as follows, viz: It is placed with the teeth lying on the ground, and the plane of the handle, of course, perpendicular to the ground, or nearly so. A horse is then put to it, by means of ropes of convenient length extended from his collar, and fastened to the arms at the ends not connected with the head, and draws the instrument in the position above mentioned, teeth foremost; the tender walking behind, and managing the rake by the handle. When it has collected as much hay, or grain, as the tender desires to collect at once, he loosens his hold of the handle, giving it, if necessary, a push, and the rake instantly rolls quite over, revolving forward on its axles, or gudgeons, in the arms, thus discharging its load, and at once resuming its position again, to collect another load.

The instrument may be very conveniently used, also, as a ladder, to mount a stack, or hay-loft, upon.

The principle on which this instrument operates, is that of the wheel and axle, the moving power being applied in such a direction by means of the position of the gudgeons, or axis of the machine, (as the gudgeons together may be termed,) as to cause the machine, whenever, in its sliding movement, it meets an impediment, to revolve at once upon its axis, thus surmounting the impediment by rolling over it. A mass of hay, or grain, collected upon, and forward of, the teeth, forms such an impediment; so that, in general, when the rake is thus loaded, and the tender wishes to drop the load, all he has to do is to let go his hold of the handle, and, the horse still going on, the rake instantly revolves, thus discharging its load, and at once resuming its position again, to collect another. In case the mass of hay, or grain, collected on and before the teeth, be very heavy, and the tender wishes to move it some distance before he drops it, to prevent the rake from revolving, and thus discharging the load sooner than he wishes, it will sometimes be necessary for him to throw his own weight, or some part of it, on the back part of the rake, by stepping with one foot, or both, upon the head piece. A little practise on the part of the tender, renders the management of the rake, in all its uses, very easy.

Noah Briggs.

Specification of a Patent for an improved Plough. Granted to Nathan Robinson, *Sackett's Harbor, Jefferson county, New York, February 13th,* 1835.

To all whom it may concern, be it known, that I, Nathan Robinson, of Sackett's Harbour, Jefferson county, in the State of New York, have invented certain new and useful improvements in the

mode of constructing, or forming, the plough, and that the following is a full and exact description thereof.

The body of the plough is best made of cast-iron, as such instruments are now usually made, but the improvements which I have made are independent of the material, consisting of such alterations in its form and relative dimensions, as are calculated to obviate the objections most commonly made to the ploughs now in use, namely, their running hard, and their liability to become choked with dirt. The principal alterations I have made in the plough, to effect these objects, are by giving greater length to the body of it, and less curvature to the mould board, than have usually been given. In describing these improvements, I shall set down certain precise measurements and proportions; but it is to be distinctly understood that I do not intend thereby to limit myself in these particulars, but merely to exemplify the principle upon which I proceed, and to give information to those who might otherwise be at some loss in carrying my plan into operation.

From the point, or nose, of my plough, to the junction of the shank and mould board, it is formed to a radius of about seventy-two inches, keeping the same curvature, or nearly the same, through to the hinder part of the mould board, this being about the medium convexity which the under side of the furrow slice naturally takes in being raised and turned over. From the commencement of the circle at the point, or nose, I sweep up till I have raised the share of my plough about ten inches from the bottom of the land side, this being the seat, or junction, of the stem to the mould board; presenting a thin, flat wedge, and a nearly straight ascending plane, of about twenty inches, to the earth. At this point the furrow slice lies on an angle of 31° from the surface of the earth from which it is raised. From the junction of the shank to the mould board, I run back on a straight line about twenty-eight inches, and on an angle of about 40° with the land side, making my plough about twenty-one inches wide at the hind part. My share I proportion in length to the other parts of my plough; commencing about two inches above the point, I draw a line back on about the same angle with the land side that the upper edge of the mould board has, till I have obtained a sufficient width from the land side, which is about twelve inches. The long edge, which is thus presented to the furrow slice, separates it readily and evenly from the solid earth. At the termination of my share, which is about sixteen inches from the starting place, at the point, I turn an angle in the lower part of my mould board, in the usual manner; but I carry the bottom edge of the mould board back even with the bottom edge of the land side, leaving the heel thereof as many inches from the land side as the share is at the widest point; these three points then stand at right angles with each other. The bottom of my plough being about thirty inches long, I make the hind end of my mould board to slope back sufficiently to give to my plough a length of about forty-seven inches from the point, or nose, to the extreme point of the mould board.

I will now give some further particulars respecting the relative

dimensions of my plough, taken from one which I have made, and the operation of which I have tested by satisfactory experiments. Share on an angle of 31° with the bottom of the land side; the upper edge of the mould board is at an angle with the land side flatwise, 40°; the edge of the share with the land side, 32°; length of the plough on the bottom of the shank to the point of the mould board, 30 inches; the edge of the share, 17 inches; from the termination of the share to the heel of the mould board, 13 inches; cutting width at the point of the share, $11\frac{1}{2}$ inches; parting off width on the bottom, $11\frac{1}{2}$ inches; circle of the shin, 72 inches radius; circle of the concavity of the mould board, nearly the same; from the nose to the extreme point of the mould board, 46 inches; width of the mould board, 13 inches; overjet, $7\frac{1}{2}$ inches.

It will be manifest to any person that these measurements may be departed from, to a certain extent, without thereby essentially altering the character of my plough; and it will also be evident to those who are acquainted with the construction of ploughs in general, that the form which I have given to mine, by proportioning the different parts to each other, is such as impresses upon it a character by which it will be readily distinguished from others. What I claim, therefore, as my invention, is a plough formed upon the principles, or in the manner, herein set forth, by which it is made to run more easily and cleanly than those now in use.

NATHAN ROBINSON.

Specification of a Patent for a new and improved mode of constructing a Mill Bush, or Spindle Box, for Flour Mills; and also of making and fixing a Ring and Bale in the Eye of the upper Stone. Granted to WARREN P. WING, *of Greenwich, Hempstead county, Massachusetts, February 20th,* 1835.

To all whom it may concern, be it known, that I, Warren P. Wing, of Greenwich, in the county of Hampshire, and State of Massachusetts, have invented certain improvements in the manner of fixing the mill bush, or spindle box, and of constructing a ring and bale to be fixed in the eyes of millstones for the grinding of flour, or other articles; and I do hereby declare that the following is a full and exact description thereof.

I make a box, usually of cast-iron, which I adapt in size to the eye of the stone. For the sake of facility of description, I will give the dimensions of one which I have made, and which, after a fair trial, has been found to answer well in practice.

The box has a top, which top fits on to it, like a snuff-box. It is ten inches in diameter, and five inches in depth, the outer rim being three-fourths of an inch in thickness. The bottom and top are both perforated in the centre, so as to allow the mill spindle to pass through them. This box is to contain three bearing pieces, of block tin, or of any proper mixed metal, which are to be simultaneously forced up against the spindle, and which are in contact with it for

about three-fourths of its circumference, the remaining fourth being exposed to the cooling influence of the air. These metal bearings are cast into a follower of cast-iron, a birds-eye view of which resembles the letter H, the outer end of which receives the cam, or eccentric, by which the bearings are to be forced up against the spindle. Cells to receive these followers are formed within the box, by six wings, or cheeks, extending from the top to the bottom, the sides of each of the three cells thus formed being parallel to each other, that the followers may slide readily and truly therein; these wings are, of course, cast with the box. The void spaces between them admit of the contact of air with the spindle, and one of them is to be used for another purpose, to be presently described.

Between the rim of the box, and the crossbars of each of the followers, the bottom is perforated to allow the passage of round rods of iron, the upper ends of which are formed into cams, or eccentrics, for forcing up the followers, and, for this purpose, extend up through the whole depth of the box. The lower ends of the above named round rods, or spindles, extend down sufficiently below the bed stone to allow of their being acted upon conveniently, as they are all to turn at the same time. The turning them simultaneously may be effected in various ways, but that which I deem the most simple is by attaching each of the spindles to a ring, by means of a jointed crank, so that, when the ring is made to revolve, the followers will all advance at the same time; other modes will occur to any skilful mechanician, and need not, therefore, be specified.

The cover of the box I make somewhat convex; it need not be more than one-fourth of an inch in thickness; besides the perforation in its centre for the spindle, I usually drill, or cast, holes through it, near the inner edge, which I fill with wood, in order to nail the elastic collar thereto.

In order to lubricate, or oil, the spindle, I drill a hole through the bottom of the box, near the periphery, and in one of the angles formed by it, and one of the before named wings, or cheeks, in one of the void spaces. A rod extends down through this hole, in the manner of those attached to the eccentrics, and this carries a leaf within the box, to which a sponge containing oil, or a lump of grease of any suitable kind, may be attached. By turning this rod, the oil, or grease, is brought into contact with the spindle, and lubricates it; and this may be done in a moment, as often as it is found necessary.

My improvement in the bale and ring consists in casting them in one entire piece, in such way that the ring may be let into, and firmly affixed in, the eye of the stone. The bale rises as a semicircle above the ring, or forming such other curve between two opposite points on the diameter of the ring, as shall adapt it to the cock heads of spindles already made. Gains, or notches, are made under the ends of the bale, in the ring, to receive the driver.

What I claim as my invention, is the construction of a spindle box, in which the followers are moved up by eccentrics, or cams, without the necessity of stopping the mill, and operating substantially in the manner described.

I also claim the arrangement for lubricating, as herein described, and likewise the manner of constructing the ring and bale in one piece, as herein set forth; not, however, intending to confine myself to the exact form which I have described, but to vary the same in any manner which I may think proper, whilst the like ends are attained by means substantially the same.

WARREN P. WING.

TRANSLATIONS FROM FOREIGN JOURNALS.

On the Action of Hydro-chlorate Muriatic Acid Gas on Silver, at a high temperature. Theory of the Method of Parting in the Dry Way. By M. BOUSSINGAULT.

(Translated for this Journal, by Jos. Wharton.*)

By the phrase *parting in the dry way*, the old chemists designated an operation by which they were able, by a long continued cementation, to remove, almost entirely, silver, and the other metals that are found alloyed with gold. This process has its origin in the highest antiquity, and it was not till near the year 1350, that the method of parting by aquafortis began to be at all known throughout Europe; while, owing to the high price of the acids, the use of this process was, for a long time, confined to the laboratories of experimenters, and the operations by the dry way, such as sulphuration by crude antimony, (sulphuret of antimony,) treatment with corrosive sublimate, and cementation with white clay and salt, continued to be employed for the purification of gold.

Since that time, however, among the various results effected by the great progress of the arts dependent upon chemistry, the great diminution in the price of the acids, that followed as a consequence, soon rendered the method of parting in the wet way practicable on a large scale; and it is generally known to what a high degree of perfection the refining of gold and silver is now carried, by the French in particular, so that, at the present day, the ancient processes have been entirely abandoned throughout Europe.

But the European arts, which were established in the new world at the period of its discovery, have remained there so nearly stationary, that I found, not long since, in various workshops, the processes of the middle age. Thus, in establishments as important as the mints of New Granada, the separation of the silver contained in the gold of the mines, is still effected in the dry way. I could hardly have been placed in circumstances of a more interesting nature than thus to find myself, as I did, among the instruments of the period of the chemistry of the furnace, and even to meet, scientifically speaking, with the men of that epoch. It was as if I had met with chemists, who had just waked up, after a sleep of three centuries.

* At the request of the Committee on Publications.

In the mint of Santa-Fé, cementation, or parting in the dry way, is always employed, when it is desired to free the gold of the mines from the silver that is combined with it, oftentimes in large proportions, so as to bring it to the state of purity required by the law for the regulation of the gold coinage.

The argentiferous gold being first reduced to the granular state, is subjected to the process of cementation in kettles of porous earth. The cement is composed of two parts of brickdust, and one of powdered sea salt, mixed together. A layer of this cement is first spread out on the bottom of the vessel, and is then covered with the granulated ore; this last is then covered with a fresh layer of cement, and so on. The layers of cement should be about an inch in thickness. A cementing pot contains, generally, from ten to fifteen pounds (French) of gold.

The furnace in which the cementation is effected, is a hollow cylinder, four and a half feet in diameter, by nine feet in height; at about three feet from the ground, is placed a grate, on which the cementing pots stand. At the bottom of the furnace, on the very level of the ground, an opening is made, through which the fuel is introduced. This furnace has neither fire grate nor chimney, and the cementing pots are put in and taken out from above.

The operation requires from twenty-four to thirty-six hours, varying with the quantity of silver to be extracted; the cementing pots are kept at a cherry red heat.

The operation being finished, the cement is washed in water, which causes the gold to separate in grains, of about twenty-one to twenty-two carats. These are melted together into bars of a suitable size, for *lamination*.

The cement, after being pounded into a fine paste, is mixed with one-tenth its weight of sea salt, and then amalgamated with mercury. The mercury added is nearly ten times the amount of silver present in the cement. The process of amalgamation is carried on in large wooden troughs, at a temperature varying from 14° to 18° of the Centigrade scale, (57.2° to 64.4° Fahrenheit;) the operation requires from four to five days.

The chloride of silver enclosed in the cement is reduced by the mercury, during the process of amalgamation; chloride of mercury is formed, and carried off in the washings; while the metallic silver amalgamates with mercury. This amalgam is always very dry, on account of the large quantity of chloride of mercury diffused through its mass. The silver obtained after driving off the mercury, is nearly pure, containing only a few thousandths of gold. In the process of cementation, the silver is converted into a chloride by the action of the dry clay, and the equally dry marine salt, a reaction which does not receive a satisfactory rationale from the facts hitherto determined on the subject.

But, however this may be, since the process was attended with success, in the case of argentiferous gold in large sized grains, I determined to apply it to the extraction of silver contained in powdered gold, extracted by washing from pyrites. This gold ordinarily contains 0.26 of silver; but before operating on large quantities, I wished

to attempt certain modifications, by erecting a furnace more economical in point of fact, but particularly by the substitution of Cornwall crucibles, for holding the mixed powders, instead of the fragile vessels above referred to, so that the chances of fracture might be diminished as far as possible. With this view, the mixture of powdered gold and cement was placed in a crucible, and exposed for thirty hours to the heat of a furnace, wood charcoal being used for fuel. At the end of this time, the standard of the gold was not sensibly altered; a result which, it will be admitted, was calculated to surprise. I had the patience to keep the powdered gold under the heat for seventy-two hours; but, notwithstanding, the gold was found, after the operation, to contain almost as much silver as before it was subjected to the fire. In a word, all my efforts with good crucibles uniformly failed, and I was forced, to the great satisfaction of the workmen, to return to the *ancient* method of operation. It seemed extremely probable that the access of air was indispensably necessary to ensure the success of the cementation; it was, at least, only in this way that I could account for the advantage presented by badly burnt and porous earthen vessels, over crucibles of a good quality, and, so to speak, impermeable. To satisfy myself on this point, I made the following experiment.

I took two laminæ of silver, weighing each 24.6 grains; one of these I placed in the centre of a small porcelain vessel, filled with a cement of sea-salt and brickdust; the vessel was placed in the centre of a crucible, and covered over with charcoal powder, heaped up around it; so that all precautions were taken to keep the metal out of contact with the air. The other silver plate was, on the contrary, exposed on a cupel containing the cement, and the cupel was placed under the muffle of an assay furnace; so that, in this case, the access of air was facilitated as much as possible. Heat was applied for seven hours; the sheet enclosed in the crucible had not, at the end of that time, materially diminished in weight; it still weighed 24.3 grains; while, on the contrary, that placed under the muffle weighed only 9.5 grains; it had, consequently lost 15.1 grains. The surface of the second plate was much corroded, and the cement was impregnated with chloride of silver.

The presence of air was thus shown to be indispensable to the success of the cementation; but its action, in the conversion of the silver into a chloride, still remained to be examined. I first endeavoured to determine whether sea salt alone could attack silver at a red heat; but a sheet of this metal, placed in a cupel, under the muffle, and covered over with sea salt, experienced no alteration, even after being subjected for three hours to the heat. During the progress of this experiment, I had occasion to observe the great increase in the volatility of chloride of sodium, produced by the passage of a current of very hot air. The salt, as soon as it was placed in the cupel, (under the muffle,) gave out fumes in abundance, and, in a short time, was entirely dissipated.

It follows, then, from this experiment, that the presence of the clay, also, is essential to the conversion of the silver into a chloride,

by the action of sea salt; and as it is composed of silica and alumina, it appeared worth while to study separately the action of these two substances.

Two laminæ of silver, weighing each 6.5 grains, were accordingly placed in two different cupels; in one of these cupels was put a cement, composed of silica and sea salt; in the other, a cement composed of alumina, and the same. For four hours, the muffle of the furnace was kept at a heat above a cherry red; at the end of this time, the silver in the aluminous mixture had completely disappeared. On cooling, the cement belonging to this cupel was slightly agglutinated; it presented a crystalline structure, but was not sensibly saline to the taste. When first taken from the furnace, it was of a brilliant white appearance, but on exposure to the solar rays, it soon acquired a deep violet tint; the sheet enclosed in the silicious cement still weighed four grains; it presented a very striking crystalline appearance, over the whole extent of its surface; certain points were covered with a plaster, so to speak, of an olive green, which adhered strongly to the metal; the parts of the cement that had been in contact with the silver, were of a deep brown colour. The cement was not saline to the taste, and was almost wholly vitrified. It is doubtless to this last circumstance that the failure of the cementation with the silicious mixture must be attributed.

It is known that, even at a high temperature, silica exerts positively no action upon sea salt, if the materials be perfectly dry; but the researches of MM. Thenard and Gay Lussac, have shown that the presence of watery vapour immediately determines an energetic action, attended by the disengagement of hydro-chloric acid gas, and the formation of silicate of soda. It is evident, then, that, in the above experiment with the silicious cement, vapour of water was present, since the chloride of sodium was vitrified by the silica. The air, in traversing the muffle of the cupel furnace, must, then, have carried with it a sufficient quantity of watery vapour to establish the reaction. In cementation on a large scale, such as is carried on at Santa-Fé, the cementing materials are constantly surrounded with watery vapours, produced during the combustion of the wood.

To prove that it is really the vapour of water constantly present in the atmosphere, or that produced during the combustion of the fuel, which renders the presence of air necessary in the cementing process, I placed a sheet of silver, surrounded with cement, in a porcelain tube, and, after raising it to a red heat, caused a stream of well dried air to pass through it; as I expected, the silver suffered no change whatever. A difficulty, however, still remained. If, as seemed evident, the vapour of water be the agent that determines the action of the earths on the sea salt, hydro-chloric acid should, indubitably, be produced; and as we have found that the silver is transformed into a chloride, and no hydro-chloric acid is evolved, it follows, as a probable consequence, that the last named substance is decomposed by silver at a red heat, though this metal is generally supposed to exert no action whatever on hydro-chloric acid gas, even at high degrees of heat; this point remained, then, to be determined.

A lamina of silver, twisted into a spiral, was introduced into a tube of porcelain, and placed in a furnace. By one end of the tube was introduced a current of hydro-chloric acid gas, previously dried by passing through chloride of calcium;* at the other extremity was fitted a tube, entering under a bell glass filled with water. When the heat rose to a red, hydrogen gas began to be disengaged, but very quickly ceased coming over, the acid gas then continuing its passage, without decomposition, and the water of the bell glass became acid. On examination, the surface of the silver was found to be covered with a varnish of chloride of silver, and it was clear that the metal had been protected from further contact with the acid by the coating thus afforded it.

To remedy this difficulty, in a measure, the silver lamina was surrounded with alumine, for the purpose of absorbing, as much as possible, the chloride produced. This second experiment succeeded much better than the former, and I was enabled to fill several test tubes with the hydrogen evolved; the exit of this gas under the receiver took place, however, in very small bubbles, and it was easy to perceive, from the strong acidity of the water, that the greater part of the acid still escaped decomposition. The evolution of hydrogen became slower and slower, and soon entirely ceased. The silver, when examined, was found to be much corroded, although the chloride produced had entered but very little into the body of the alumine, and the metal was still covered with a layer of chloride, which was a sufficient reason why the silver had escaped final destruction.

In a second experiment, in which I added sea salt to the alumine, the operation continued without interruption, although, as in the preceding experiments, the hydrogen was evolved in very small bubbles, and the greater part of the acid passed over without decomposition. The addition, in this case, of the sea salt, was found to have greatly facilitated the diffusion of the chloride of silver through the alumine, and it is more than probable that the effect is due to the tendency of the two chlorides to combine together. The double chloride thus produced may be formed directly by the addition of chloride of silver to chloride of sodium, in a state of fusion. When thus formed, it solidifies, on cooling, to a low red heat, and, when cold, is vitreous,

* In my first experiments, I did not adopt the precaution of drying the acid; but in consequence of a suggestion that the effect might be possibly due to the decomposition of water, the affinities called into play being those of silver for oxygen, and of hydro-chloric acid for the oxide of silver, in which case, the hydrogen evolved would be furnished by the water, I caused the gas, in my succeeding experiments, to pass previously over chloride of calcium. An objection might, however, still be raised; it might possibly be the case, that the gas was not completely dessicated by the chloride, but that a portion of aqueous vapour still remained. To determine whether this be the case, I made use of a test previously employed by MM. Thenard and Gay Lussac. I caused a portion of the dried gas to pass into a receiver of fluoboric acid gas, but the mixed gases retained the transparency they possessed when separate. The extreme sensibility of the fluoboric acid gas, as a hygroscopic agent, was shown by the admission of atmospheric air into the mixture, when a cloud was instantly produced.

transparent, and slightly opaline; its taste is saline, and not at all metallic; it is decomposed by the contact of water. Exposed to the solar light, its colour changes to a violet.

I further demonstrated the action of hydro-chloric acid on silver, as follows:

A very thin lamina of this metal, weighing 13.3 grains, was put into a cupel, and a current of the acid gas was caused to flow, for an hour's time, under the muffle of the furnace in which it was placed. During the whole of the experiment, a light white vapour arose from the cupel. The silver, after the operation, was found to weigh only 9.5 grains; its surface was corroded; no trace of chloride was observable on the cupel; in this case, the chloride was evidently carried off, at the instant of its formation, by the gaseous stream. It might be supposed, from the power possessed by silver of fixing oxygen at high temperatures, that, during the cementing process, the contact of the air facilitated the action of the acid by furnishing that gas; but a comparative experiment, made with two silver laminæ, presenting exactly the same extent of surface, showed that this is not the case, and that the oxygen of the air does not sensibly facilitate the action of hydro-chloric acid on silver.

The decomposition of hydro-chloric acid by silver, is an analogous fact with that of the decomposition of water by iron. The silver absorbs the chlorine of the acid gas, in like manner as the iron does the oxygen of the watery vapour, and hydrogen is set at liberty in both cases. On the other hand, at the same temperature at which these decompositions are produced, hydrogen gas possesses the property of reducing to the metallic state, the chloride of silver, and the oxide of iron, with the production, respectively, of hydro-chloric acid and water.

When silver is submitted to a continuous current of hydro-chloric acid gas, the hydrogen evolved is immediately enveloped in so large a quantity of the acid gas, that the mixture is too dilute—the hydrogen being considered the active agent—to react on the chloride already formed; the hydrogen, moreover, is rapidly carried off by the gaseous current.

When, on the other hand, chloride of silver is reduced by a current of hydrogen, the inverse is the case; the hydro-chloric acid produced is rendered inactive, by reason of the large amount of free hydrogen present.

To convert silver into a chloride by the action of hydro-chloric acid gas, it will then be necessary to employ a great excess of the latter; and, on the other hand, to reduce the chloride of silver, a much greater amount of hydrogen will be required than is simply sufficient to convert the chlorine into hydro-chloric acid.

The fact of the decomposition of hydro-chloric acid by silver once admitted, the phenomena that ensue during the process of *parting in the dry way*, are readily explained; the clay of the cement, assisted by the presence of watery vapour, reacts on the sea salt; hydrochloric acid results, and converts the silver into a chloride. The chloride thus produced combines, probably, with the sea salt, and

forms with it a double chloride, which is absorbed by the mass of the cement, so as to leave the surface of the silver perfectly clean. A fresh portion of the hydro-chloric acid is thus permitted to act on a fresh surface of the silver, and the operation is thus enabled to continue until the latter has been entirely converted into chloride.

(*Annales de Chem. et de Phys.*

Mode of Joining two Pieces of Amber.

[Translated for this Journal, by John R. Warder.*]

Two pieces of amber may be very readily united by the following means.

Wet the surfaces that are to be united with a solution of caustic potash; heat them, and then press them together; the two pieces will unite so perfectly, that no trace of any joint can be perceived. Thus, with small pieces of amber, compact masses may be easily formed, which is an advantage in the arts.

Process for obtaining the Sub-carbonate of Lead, or White Lead, by treating the Sulphate of this Metal with the Carbonates of Potash, or Soda, and for making Acetate, Nitrate, and Hydrochlorate, of Lead, by the reaction of the Carbonate of Lead, and Acetic, Nitric, and Muriatic Acids. By M. A. Penot, *Professor of Chemistry applied to the Arts.*

[Translated for this Journal, by John R. Warder*.]

The principle upon which this process depends, is known to every chemist, but I believe it has never been applied to common use in the arts.

For some time there has been made annually in the numerous manufactories of printed calicoes in the department of the Upper Rhine, an immense quantity of sulphate of lead, which, until now, they have vainly endeavoured to turn to account, so that the manufacturers try to get rid of it, as an encumbrance.

I think, therefore, I have applied a principle of chemistry in a new way, and favourable to practice in the arts, by making use of a product which has, until now, been thrown away, for the formation of another production, for which we are, as yet, tributary to foreign nations.

To obtain the Sub-carbonate of Lead.

Boil in a cauldron,

Real sub-carbonate of soda,	54 lbs.
" " potash,	70 "
With sulphate of lead,	150 "

* At the request of the Committee on Publications.

When it no longer effervesces with an acid, the operation is ended; there is then withdrawn from the composition,

Sulphate of soda, in solution,	72 lbs.
Sulphate of potash, in solution,	88 "
Sub-carbonate of lead, or ceruse, precipitated,	134 "

To obtain the Acetates, Nitrate, and Hydrochlorate, from the same basis.

To extract these salts, it is necessary to add gradually, to avoid too great an effervescence to the 134 lbs. of sub-carbonate of lead before obtained,

Real acetic acid, . .	50 lbs.
" nitric acid, . . .	54 "
" hydrochloric acid, . .	37 "

By this means are obtained,

Acetate of lead, . .	152 lbs.
Nitrate of lead, . . .	166 "
Hydrochlorate of lead, .	159 "

In each of these cases, the operation is at an end, when there is no effervescence upon casting the acid upon the sub-carbonate of lead.

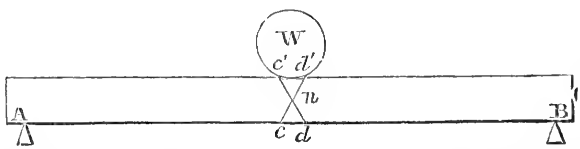
Observations.

My process for obtaining the acetate, nitrate, and hydrochlorate of lead, would become more costly than those which are at present followed, if I were obliged to buy the white lead of commerce, but by employing only that obtained by the processes that I have just described, with the articles at the price at which I have estimated them, these products may be delivered at the present current prices.

Report to the Directors of the London and Birmingham Railway Company, accompanied by Experiments on the Transverse Strength, &c. of Malleable Iron, with reference to its use for Railway Bars. By PETER BARLOW, *Prof. Royal Mil. Acad., Woolwich.*

(Continued from page 127.)

Experiments to determine the comparative Resistance of Malleable Iron to Extension and Compression, and the Position of the Neutral Axis in Bars submitted to a Transverse Strain.



Let A B represent an iron, or any other bar, supported at A and B, and loaded in the middle by a weight, W, which deflec s

it, extending the fibres between n and $c\ d$, and compressing those between n and $c'\ d'$. Now, supposing the system in equilibrio, $\frac{1}{2}$ W acting at the extremity of the $\frac{1}{2}$ length, or $\frac{1}{4}\ l$ W, is equivalent to the sum of all the resistances to extension in $n\ c\ d$, and to all those of compression in $n\ c'\ d'$; each fibre acting on a lever equal to its distance from the neutral axis, n. Consequently, as the quantity of extension of any fibre is as its distance from the neutral axis, and the lever by which it acts being also as that distance, the actual resistance of a fibre at the distance, x, is as $\frac{x^2 t}{d'}$ t being the tension of the lower fibre, and d' its depth below the neutral axis; and the sum of all these resistances will be $\int \frac{t\, x^2 d\, x}{d'} = \frac{1}{3}\, d'^{\,2} t$, (when $x = d'$) or for the whole depth. In the same way, c being taken to denote the compression of the upper fibre, corresponding to the tension, t, the sum of all the compressions will be,

$$\frac{1}{3}\ d''^{\,2}\, c,$$

d'' denoting the depth of compression; hence the whole sum is,

$$\frac{1}{3}\ d''\, c + \frac{1}{3}\ d'^{\,2} t = \frac{1}{4} \mathrm{W}\ l;$$

but $d''\, c = d'\, t$,* the quantity of resistance being equal to that of extension; this, therefore, becomes

$$\frac{1}{3}\ d''\, d'\ t\ + \frac{1}{3}\, d^{\,2} t = \frac{1}{4}\ l\ \mathrm{W}, \text{ or}$$

$$\frac{1}{3}\ (d'' + d')\, d'\, t = \frac{1}{4}\ l\ \mathrm{W}, \text{ or}$$

$$\frac{1}{3}\ d.\ d'\, t = \frac{1}{4}\ l\ \mathrm{W}.;$$

d being the whole depth, and d' the depth of tension; whence

$$d' = \frac{3\, l\, \mathrm{W}}{4\, d\, a\, b} = \text{depth of tension, and}$$

$$d - d' \text{ the depth of compression;}$$

* To prevent misapprehension, it may be proper to observe, that c here is not intended to represent the force requisite to compress a fibre the same quantity that the force t extends it; but simply the force of compression at c, corresponding to the tension t on the lower fibre. The equation, therefore, $d''\, c = d'\, t$, is equivalent to saying that the sum of all the forces in $n'\ c'\ d$ is equal to all the forces in $n\ c\ d$, or that $a\, g = n\, a'\, g'$; $a\ a'$ denoting the areas, and $g\ g'$ the distances of the centres of gravity from n, and taking $n\ t$ to denote the force which will compress a fibre to the same extent as the force t will extend it.

consequently, $\frac{d'}{d - d'}$ the ratio, in which the neutral axis divides the sectional area into rectangular bars.

Comparison of the Formula with Experimental Results.

In order to submit this formula to practical results, a strong iron frame was forged, of the form shown in fig. 1; D C is thirty-six inches long, six inches broad, by two deep; the arms two inches square, and the ends of proportional dimensions to those represented. The other view of the arms is represented in fig. 2, with an opening six inches by three, in which the bars for experiment were placed, as represented by A G B; the space between is thirty-three inches. The shackles were applied at E and G, and connected by strong iron cables to the press; the strain was then brought on, and the results recorded.

Fig. 1.

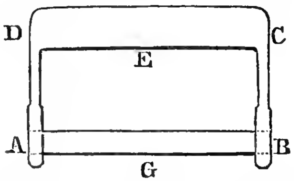
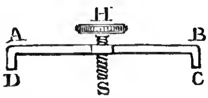


Fig. 2.

In order to measure, with every requisite accuracy, the deflections which the bar sustained, as different weights were applied, an instrument, of the form shown in fig. 3, was neatly and accurately made in iron, having two feet, A D, B C; the centre was tapped to receive the brass screw, H S, of twenty threads to the inch, and the head was divided into five equal parts; and by again subdividing these divisions into ten, a deflection of $\frac{1}{1000}$ of an inch might be measured with great ease.

Fig. 3.



The method of applying it, was to rest its feet on the bar, and then to retain it in its place by cramps and screws. The micrometer screw was then run down till it was in contact with the bar, and the divisions read and registered, either before any strain was on, or when the first slightest strain could be estimated, as stated in the following table.

The first six experiments were made on different parts of the bars, Nos. 5, 6, and 7, without cutting them, by introducing them into the iron frame above described, (having thirty-three inches clear bearing,) and straining them till the successive deflections showed a tendency to increase in amount, which was taken as a sign of the elasticity being injured; and the amount of this strain having been previously ascertained by the former experiments, they furnish the best possible data to apply to the formula for determining the position of the neutral axis.

Experiments made to ascertain the Deflections due to different Transverse Strains, and the weight which first produces a Strain equal to the Elastic Power, and thence the position of the Neutral Axis.

TABLE III.

Part 1. Bar No. 5. Bearing 33 inches. 2 inches square.		
Weight in tons.	Readings by scale.*	Deflections for each half ton.
No weight	1.96	
.875	1.92	.023
1.00	1.90	
1.50	1.90	.016
2.00	1.88	.020
2.50	1.86	.020
Weight removed.	returned to 1.96	
3.00	1.80	Elasticity injured.
Weight removed.	1.88	

Part 2. Bar No. 5. Bearing 33 inches. 2 inches square.		
Weight in tons.	Readings by scale.	Deflections for each half ton.
No weight	1.95	
.750	1.92	.020
1.00	1.91	.020
1.50	1.89	.020
2.00	1.86	.030
2.50	1.84	.020
Weight removed.	returned to 1.95	
3.00	1.67	Elasticity injured.
Weight removed.	1.81	

Part 1. Bar No. 6.		
Weight in tons.	Readings by scale.	Deflections for each half ton.
No weight		
.50	1.56 ?	
1.0	1.50	.020
1.5	1.48	.030
2.0	1.45	.210 Elas. inj'd.
2.5	1.24	
3.0		

Part 2. Bar No. 6.		
Weight in tons.	Readings by Micro. Screw.	Deflections for each half ton.
No weight	.025	
.50	.043	.018
1.0	.068	.025
1.5	.091	.023
2.0	.128	.037 injur'd
2.25	.178	.100
2.50	.313	.185

* In the first of these experiments, the deflections were measured by a scale in front of the bar, the micrometer screw not being ready.

TABLE III.—(*Continued.*)

Part 1. Bar No. 7.			Part 2. Bar No. 7.		
Weight in tons.	Readings by Mic. Screw.	Deflections for each half ton.	Weight in tons.	Readings in Mic. Screw.	Deflections for each half ton.
No weight	.031		No weight	.025	
.50	.053	.022	.50	.056	.031
1.0	.077	.024	1.0	.077	.021
1.5	.096	.019	1.5	.098	.021
2.0	.126	.030	2.0	.109	.011
2.5	.147	.021	2.5	.137	.028 injur'd
3.0	.211	.064 injur'd	3.0	.180	

Part 3. Bar No. 7.			Part 2. Bar No. 7. Reversed.		
Weight in tons.	Readings by Mic. Screw.	Deflections for each half ton.	Weight in tons.	Readings by Mic. Screw.	Deflections for each half ton.
No weight	.075 ?		No weight	.025	
.50	.130		.50	.054	.029
1.0	.153	.023	1.0	.092	.038
1.5		.023	1.5	.153	.061
2.0	.199	.023	2.0	.235	.082
2.5	.220	.021	Elasticity clearly injured by the former experiment.		
3.0	2.90	.070 injur'd			

It appears from these experiments, that both parts of the bar No. 5, (whose direct elasticity was 9.5 tons,) had their restoring power just preserved with a transverse strain of two and a half tons on a bearing length of thirty-three inches. Hence, in the formula:

$$d' = \frac{3\,l\,w}{4\,d\,a\,t}$$

we have $l = 33$, $w = 2\frac{1}{2}$, $d = 2$, $a = 2$, $t = 9.5$, and $d' = 1.62$ inches, depth of tension.

Consequently, $d'' = .38$ inches, depth of compression, and the ratio of the area of compression to tension, . 1 : 4.3

In the first part of Bar No. 6, w is not quite 2 tons, and $t = 8.5$ tons; and hence the ratio, . . . 1 : 2.7

In the second part of the same bar, ditto . . 1 : 2.7

In the first, second, and third parts of Bar No. 7, $w = 2\frac{1}{2}$ tons, and $t = 10$ tons, ... 1 : 3.4

As far as these experiments are authority, therefore, the neutral axis divides the sectional area of a rectangular bar in about the ratio of one to three and a half.

In the following experiments, the iron was all supplied by Messrs. Gordon, and was of the same quality as the bar No. 7; its elasticity, may, therefore, be taken as ten tons, but it was not determined by testing, as in the preceding experiments.

TABLE IV.

Bar No. 8.

Distance of bearing.	Breadth.	Depth.	Weights.	Deflections.	Deflections each half ton.	Remarks.
inches.	inches.	inches.	tons.			
33	1.9	2	.125	.034		
			.250	.046		
			.500	.060		
			1.00	missed	.019	
			1.50	.098	.019	
			2.00	.120	.022	Mean .024
			2.25	.134	.028	w = 2.25. Neutral
			2.50	.151	.034	axis, 1 : 3.4.
			2.75	.176	.044	Elas. inj'd with 2.50 T.
Bar No. 9.						
33	1.9	2	.250	.047		
			.500	.055	.016	
			1.00	.077	.022	
			1.50	.097	.020	Mean ·021
			2.00	.123	.026	
			2.25	.132	.018	
			2.50	.145	.026	w = 2.25. N. ax. 1 : 34
			2.75	.164	.038	Elasticity inj'd with 2.50
			3.00	.210	.092	Ditto destroyed with 3.00
Bar No. 10.						
33	1.9	2	.500	.056		
			1.00	.076	.020	
			1.50	.095	.019	Mean .024
			2.00	.124	.029	
			2.50	.151	.027	w = 2.5. N. ax. 1 : 4.2
			3.00			

Deductions from the three last Experiments, confirmed by direct Observation of the place of the Neutral Axis.

These experiments, like the former, imply, according to the formula, that the neutral axis lies at about one-fourth or one-fifth of the depth of the bar from its upper surface; but a method was adopted in these to discover, if possible, its position mechanically. With this view, a key-way, or groove, was cut in the side of the bar, one inch broad, and one-tenth of an inch deep; thus reducing the breadth to 1.9 inches. To this key-way, or groove, was fitted a steel key, which might be moved easily; and when the strain was on, the key was introduced, which it was expected would be stopped at the point where the compression commenced, and this was accordingly found to be the case in two out of the three bars, but not in the third, the fitting not being sufficiently accurate. The other two, however, showed obviously a contraction of the groove, at about half an inch

from the top, agreeing with the preceding computations. To make the results more certain, three other bars, exactly like the former, had deeper grooves cut, and the key more exactly fitted, and with these the results were as definite as could be desired. The key, as above stated, moved smoothly and easily before the experiment; but when two tons strain were put on, and the key applied, it was stopped, and stuck at a definite point. The strain being then relieved, the key fell out by its own weight; the strain was again put on, the key sticking as before; the strain being relieved, the key again fell, and so on, as often as repeated. Precisely the same happened with all the three bars. One of them was then reversed, so that the part which had been compressed was now extended, and exactly the same result followed; showing, most satisfactorily, that our former computed situation of the neutral axis was very approximative. The measurements obtained in these experiments being tension 1.6, compression .4, giving exactly the ratio of 1 to 4 in rectangular bars. These results seem the most positive of any hitherto obtained; still, there can be little doubt this ratio varies in iron of different qualities; but looking to the preceding experiments, it is probably always between 1 to 3, and 1 to 5.

On the Stiffness of Rectangular Iron Bars, and their Deflections under different Weights.

Although it is necessary to know the actual resisting power of bars in their ultimate state of strain, in order to determine the relative strengths of differently shaped bars, yet the question of most practical importance is, the stiffness they exhibit when loaded with smaller weights; for we ought never to strain a bar so nearly to its full power of bearing, as to make this the immediate subject of inquiry.

The experiments recorded in the last section are applicable to this purpose, but as these are all of the same depth, it was thought more satisfactory to make a few other experiments on bars of different breadths and depths. These are given in the following page. They were performed precisely like the last, and, therefore, require no particular description.

Experiments on the Deflection of Malleable Iron Bars, under different Strains.

Bar No. 11.

Distance of bearings.	Breadth.	Depth.	Weight.	Deflections.	Deflections for each half ton.	Remarks.
inches.	inches.	inches.	tons.			
33	1.5	3	.125	.043		
			.500	.059		
			1.00	.074	.015	
			1.50	.083	.009	
			2.00	.095	.012	
			2.50	.101	.006	Mean .0103
			3.00	.109	.008	
			3.50	.120	.011	
			4.00	.131	.011	$w = 4\frac{1}{4}$. N. ax. 1 : 4.9
			4.50	.148	.017	Elas. pres'd at $4\frac{1}{4}$ tons.
			Bar No. 12.			
33	1.5	3	0	0		
			.50	.017		
			1.00	.037?		
			1.50	.052	.015	
			2.00	.061	.009	
			2.50	.064	.003	Mean .0108
			3.00	.078	.014	
			3.50	.089	.011	
			4.00	.102	.013	$w = 4\frac{1}{4}$. N. axis 1 : 4.9
			4.50	.124	.022	Elasticity injured.
			Bar No. 13.			
33	1.5	2.5	0	.006		
			.50	.003	.024	
			1.00	.050	.020	
			1.50	.060	.010	Mean .0173.
			2.00	.074	.014	
			2.50	.093	.019	
			3.00	.110	.017	$w = 3$. N. axis 1 : 4.9
			3.50	.149		Elas. preserved, 3 tons.
			7.5	Bent 8	inches.	

To reduce the law of deflection from these results, we may have recourse to two well known and well established formulæ, viz:

$$\frac{l\,w}{4\,a\,d^2} = S \text{ and } \frac{l^3\,w}{a\,d^3\,\delta} = E,$$

which are both constant quantities for the same material, w being the greatest weight the bar will bear, without injuring the elasticity; consequently, when l is also the same in both, $d\,\delta$ will be also constant, a being the breadth, d the depth, and δ the deflection. That is, all rectangular bars having the same bearing, length, and loaded in their centre to the full extent of their elastic power, will be so deflected, that their deflection (δ) being multiplied by their depth, (d,) the pro-

duct will be a constant quantity, whatever may be their breadths, or other dimensions, provided their lengths are the same.

Let us see how nearly our several results agree with this condition.

In the several bars, Nos. 8, 9, 10, 11, 12, 13, multiplying the mean deflection for each half ton, by the number of half tons which excited its whole elasticity, and this again by the depth of the bar, we find,—

	Depth.
No. 8, ultimate deflection, .	$.108 \times 2 = .2160$
No. 9, ...	$.094 \times 2 = .1880$
No. 10, ...	$.120 \times 2 = .2400$
No. 11, ...	$.0876 \times 3 = .2628$
No. 12, ...	$.0918 \times 3 = .2754$
No. 13, ...	$.1038 \times 2\frac{1}{2} = .2595$
	6) 1.4417
Mean,	.2403

There is rather a large discrepance in bar No. 9; the others are as approximative to the mean as can be expected in such cases.

If we make the same trial on the three parts of bar No. 7, we have,

1st part	.116	×	2	=	2320
2d part	.105	×	2	=	.2100
3d part	.115	×	2	=	.2300
					3) 6720
Mean, . .					.2240
Former mean, . .					.2403
					2) .4647
General mean, . .					.2323

We may, therefore, say, that any malleable iron bar, of 33 inches bearing, being strained to its full elasticity, will be so deflected, that its depth, multiplied by the deflection due to 30 inches, will produce the decimal .23; consequently, $\frac{.23}{d}$ = the deflection, d being the whole depth in inches.

In this form, however, it applies only to rectangular bars. To make it general, we must estimate it from the neutral axis, which in rectangular bars, being one-fifth of the depth below the upper surface, the above constant, when thus referred, becomes $.2323 \times \frac{4}{5} = .1858$. But, on the other hand, our instrument for measuring the deflection was but thirty inches long; it has, therefore, to be increased again in the ratio $30^2 : 33^2$, or as $10^2 : 11^2$, on this account; so that, ultimately, the formula is $d' \delta = .22$, d' denoting now the depth of the bar below the neutral axis; and in this form it is general for parallel rails of any section whatever.

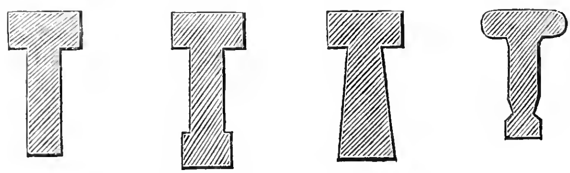
A curious circumstance was observed in these experiments, which, although it has no immediate bearing on the subject in question, it may be well to notice, and which is, I apprehend, characteristic of good malleable iron, viz: that the resistance to compression, although so much greater than the resistance to extension, is the first of the two which loses its restoring power; for, if we so far increased the strain as to overcome the elastic power, the point of compression descended to nearly the middle of the depth, proving that the tensile force, although so much less, is the most tenacious; whereas I suspect that in cast-iron it is the reverse, that is, it is here the tensile power which first yields, and the consequence is a sudden fracture, and momentary destruction of the bar.

On the Sectional Figure of Greatest Resistance, the Area being given.

Having established the preceding data, I might now proceed directly to find, with a given sectional area, the figure of greatest resistance; but this would be of little advantage, for the form we should arrive at would be quite inapplicable to a railway, as it would require the metal to be principally collected in the lower table; whereas, in the railway bar, we must, of necessity, bestow a certain quantity, perhaps two-fifths of the whole, in forming the upper table on which the carriage runs; it is, therefore, only after this is provided for, that we are at liberty to dispose of the remaining part of the metal, and, even in this distribution, regard must still be had to practical convenience. Instead, therefore, of determining, mathematically, the area of maximum resistance, the most useful plan will be to compute, directly, the resistance of such sectional figures as fall within the limits of practical application, and to select from them that which, under all considerations, is the best.

The three forms of rails which, under this restriction, will have to be considered, are the following:

Fig. 1. Fig. 2. Fig. 3. Fig. 4.



1. The plain T shaped rail, fig. 1.
2. The H, or double T, formed rail, with a lower table, as fig. 2.
3. The Trapezoidal rail, as fig. 3.

Each of which will admit of various changes of proportions, without altering the general character of the section.

The upper and lower tables are here represented as rectangular, with sharp edges. In practice these are rounded off, the metal thus displaced furnishing a sort of bracket between the table and stem, or rib, as shown in fig. 4; but to treat of them in this form would intro-

duce great intricacy into the calculation, without much affecting the results. It will, therefore, be sufficient to consider them as rectilinear.

I would here observe, also, that some projectors have made the upper and lower tables of equal figure, upon the distant contingency, that when the upper table has been worn down, the rail may be turned, and the lower table made the upper. But this is certainly providing without foresight; for the bottom table is the most efficient for strength, and it would be a very dangerous experiment, after one side of a bar has been submitted for many years to a high compressing force, and its substance (by the hypothesis) greatly worn, to turn the rail, and expose this worn part to a still greater strain, but tensile instead of compressive, which could not fail instantly to destroy it. Instead of this, therefore, I should certainly recommend to work whatever metal is introduced into the lower table, or web, into that form which is most efficient for present purposes, without regard to the contingency alluded to above.

That the rail is deteriorated by exposure and wear, is undoubtedly true, although, perhaps, the amount is not yet well ascertained. Amongst the papers submitted to Messrs. Rastrick and Wood, with whom I was associated, we found it estimated at the rate of one-sixth of a pound per yard per annum; but I have since seen it stated, in a letter from Mr. Dixon to Mr. Bidder, at one-tenth of a pound per yard per annum. This was determined by taking up three rails, having them well cleaned and weighed, and then putting them in their places, and afterwards washing and reweighing them at the end of a twelvemonth, when two of them were found to have lost a half pound in weight for the five yards length, and the third three-fourths of a pound, which last was taken up from a particular situation, where it was more exposed to friction. But even this does not prove that the whole loss of weight is in the upper face of the rail; and if it did, it would be, as I have before observed, a stronger reason for not turning the rail; and, on the other hand, should the waste not be on the upper surface, the provision alluded to is unnecessary. Mr. Rastrick informs me, that even the small fins left at the meeting of the rolls are still quite distinctly seen on the face of the upper table; and Mr. Stephenson states, that the marks of the tools left in turning the flanches of the wheels are seldom obliterated; which proves, at all events, that there is no side wear.

Mr. George Bidder, who attributes all the waste to the wear on the upper surface, estimates the annual reduction at the one-ninetieth part of an inch; in which case, the rails would not last more than thirty years before they would require to be replaced. And it then becomes a question, whether, in point of economy, it would not be better to lay an additional third of an inch upon the upper table, which would, by this reckoning, make the rail last sixty years. This increase of one-third of an inch would call for an additional expense, to the amount of about $7\frac{1}{2}$ per cent. on the present cost; and this $7\frac{1}{2}$ per cent., at compound interest, would amount to about 30 per cent. in thirty years. If, therefore, a charge of 30 per cent., at the end of thirty years, would meet the amount of remanufacture, and supply

the waste, the two accounts would be about balanced. In this case, I must consider the latter as preferable. 1st. Because the other plan would increase the weight of the bar, and the difficulty of the manufacture, and probably diminish its soundness. 2d. Because thirty years' experience may introduce improvements, of which, at the end of that period, it would be desirable to take advantage. And, lastly, because I do not (judging from the opinion of different practical men,) think that it has yet been clearly determined what part of the waste is due to wear on the upper face.

To return again to the subject of the best formed section, I beg to repeat, that whatever figure the above, or other considerations, may lead practical men to adopt in the upper or lower table and rib, it will be fully sufficient, for the purposes of calculation, to consider them as rectilinear, which will greatly facilitate the investigation, without sensibly affecting the results.

[TO BE CONTINUED.]

¶ *Description of the Freyburg Suspension Bridge.*

The city of Freyburg, in Switzerland, is well known to most travellers for its remarkable locality, being seated partly in a deep and winding valley, watered by the river Saone, and partly on the adjacent high and overhanging cliffs. To arrive at the centre of the town, by the road from Berne, carriages were formerly obliged to descend the steep declivity of the Staalberg. On arriving at Bernegate, it seemed to travellers as if they had already got to the end of their journey; but great was their astonishment to be informed that they had yet to travel for half an hour before they could reach the city, to follow the several large windings of the river, cross it three times, and then to ascend the long, difficult, and steep ascent, called *Alt Brunnen Strasse*, (Old Well street.) which was at all times enough of itself to dismay a traveller, and has proved the death of many a horse. The bad state of the roads, and defective plan of the streets leading to the centre of the city, increased the difficulty of approaching it. Industry, commerce, social life, all felt alike the influence of this almost isolated position of the place. But what could be done? The obstacles seemed insurmountable; the almost perpendicular cliffs on which the chief part of the town stands, seemed to mock the idea of forming a street through them of any tolerable degree of ascent; and had even this been possible, it would only have tended to increase the length of the windings. On the other hand, the idea of erecting a bridge, either of wood or stone, of a sufficient height to overcome the difficulty of the rugged ascents and descents, seemed too daring for contemplation, the height being upwards of 150 feet, and the length much greater. The expense, too, especially if stone had been employed, would have been out of all proportion to the means of the citizens; for the city is not rich, being but little frequented, and thinly populated, containing, exclusive of the suburbs, no more than 9,000 inhabitants.

Some of the more public spirited and zealous citizens, who had heard of the iron suspension bridges erected in other countries, at

length proposed to raise, by subscription, the pecuniary means necessary for ascertaining the applicability of such a structure to the natural circumstances of Freyburg, and, if practicable, of actually constructing it.

As soon as the subscription reached a suitable amount, several eminent engineers were consulted, and, after examination of the plans of different competitors, M. Chaley, the famous French engineer, who erected the wire bridges at Beaucaire, Chasey, and several other places in the south of France, obtained the preference. The contract agreed on with him. on the 10th of February, 1830, was to this effect: that he was to have, at different instalments, 200,000 (Swiss) francs, for the completion of an iron wire bridge; that the expense of the approaches on both sides, and the compensation to individuals for loss sustained in their property, should be defrayed partly by the subscribers, and partly by the government; and that the contractor, M. Chaley, subject to certain conditions, should have the enjoyment of the produce from the tolls for eighty years. Some time afterwards, these conditions were considerably modified, it being agreed that M. Chaley's right to the tolls should be limited to forty years, at the end of which time the profits are to revert to the subscribers during fifty-nine years, after which the toll is to cease, and the bridge to become the property of the canton, or common property.

The first general meeting of the subscribers took place on the 19th of March, 1830, when they appointed a committee of ten members, (afterwards increased to twenty,) to superintend the erection of the bridge.

Immediately after these arrangements, the necessary preliminary preparations were entered upon; but the political disturbances which broke out, in 1830-1, in France, and afterwards in Switzerland, but particularly in the canton of Freyburg, had a most injurious influence on the undertaking; added to which, differences arose between the contractor and the committee, which tended greatly to retard the project. The general good will of the citizens, however, and the indefatigable zeal and activity of some of the leading members of the committee, recalled ere long the dormant project into activity. In March, 1832, the works were entered upon with great zeal, and the first stone of one of the porticos was laid under the superintendence of the architects Kraser and Brugger. From that time, the works were continued in every department without interruption, and, to facilitate their progress, a temporary bridge was thrown over the river Saone, it being for the ease and advantage of the workmen to get from one side to the other without loss of time.

The finances of the company were all expended, however, long before the bridge approached to its completion. But, though the funds were exhausted, the ardour and generous feeling of the subscribers and donors were not. Government, which, from the beginning, had given its particular sanction and protection to the measure, came once more to its assistance, by granting leave for the opening of a lottery, which produced to the company the sum of 80,000 francs.

The work was now once more renewed with vigour, and on the

9th of June, 1834, the subscribers had the gratification of seeing extended across the valley, the first of the numerous wires which form the two main ropes, or supports, of the bridge. Next followed the fixing of the subordinate suspension wires, and the laying down of the beams to form the foundation, or flooring, of the bridge. The latter mentioned operation took place, it might be said, in a magical manner. The inhabitants were not a little surprised to find at their gates an unlooked-for, and, for foot passengers, a sufficiently solid, bridge, where, ten days before, they had seen only two immense wire ropes. After this, the other various inferior works soon followed, as the completion of the footway, the erection of the balustrade, &c. At length, on the 8th of October, a carriage was driven over the bridge at full gallop, which was followed, on the same day, by the stage, or post-coach, from Berne to Freyburg, enthusiastically greeted by a vast number of astonished spectators.

The balustrades, though simply modelled, present, nevertheless, a very handsome appearance. Any vehicle, be it ever so heavily laden, may safely venture over; and although the ear is at first rather startled at the noise of the trampling of horses, yet the most clear-sighted person cannot discover the slightest motion communicated either to the wire ropes, or to any other part of the bridge. The traveller passing over does not feel the least vibration, and his astonishment finds no bounds, to think that he has arrived so soon, and in safety, across the deep gulf below.

As has been before observed, the whole structure is suspended by two large *ropes of wire*, firmly secured at each end, by being let into shafts made for that purpose. At each end, the porticos over which the ropes pass, serve for *antagonist supporters*, or counterforts. They are built partly of limestone, brought from Neuenberg and Neuenstadt, and partly of sand-stone, which is got in the stone quarries in the neighbourhood of Freyburg; all the blocks are, by way of greater security, connected with each other by means of iron cramps. The quantity of iron used for this purpose, was 570 cwt. The height of the porticos is 65 Berne feet. The opening for the gateway is 45 feet high, 20 feet wide, and 19 feet in depth; the width of each pillar is 14 feet. About 160 feet from the porticos, the shafts are situated; their depths are each 58 feet, and their diameters 32 feet. These shafts are hewn out of the rock on both sides, and comprise each three chambers, situated at a certain distance from each other, each containing three immense unwrought blocks of Neuenberg stone, to which the *main wire ropes* are fastened. The connecting wires, or chains, sixteen in number, are drawn through these vaults; they rest at the same time on twelve cast-iron cylinders, and are held fast by 128 anchors, or grapples, of a total weight of 1,024 pounds. These connecting ropes, or ties, serve the great main wire ropes as auxiliary supports, which bear up on both sides the great beams of the bridge flooring, by means of suspension wires, or ties. The length of the main wire ropes is 1,280 feet each; they consist each of 2,000 separate wire threads, which, united, make a mass of 4,000

threads, or little chains, of a total weight of 960 cwt. Dependent from each of the two main connecting wire ropes, or inverted arch, hang 164 smaller suspension wire ropes, at about five feet asunder; these are made fast above through iron loops, and below are connected with hoops of iron, into which the beam ends which support the footway are firmly fastened. The longest of the smaller dependent ropes of wire is sixty feet, and the shortest half a foot; each is composed of twenty-five single wires, so that the roadway of the bridge is held up by more than 8,000 single wires. The number of beams which form the foundation, or platform, of the bridge, amounts to 166, held together by 328 hoops of wrought iron. Four lines of beams run longitudinally throughout the whole length of the bridge, upon which rest the two footways. On both sides, to separate the carriage way from the footpaths, are strong oaken balustrades, made in the form of St. Andrew's cross, the height of which is four feet. The carriage way is sixteen feet, and each footway three feet wide; so that the total width of the bridge is twenty-two feet. Its total length, including the two counterforts, over which the main wire ropes are passed, is 941 feet; exclusive of the counterforts, its length is 903 feet; the carriage way alone is 864 feet. Its height above the river, when measured, 30th of October, 1834, was 163 feet.

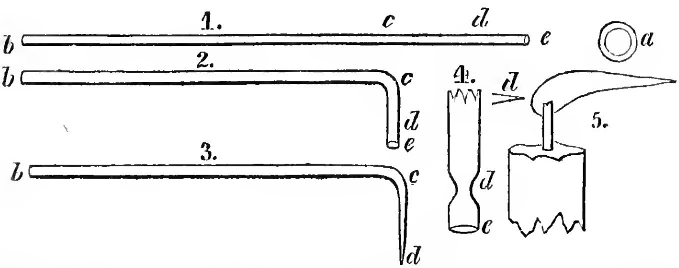
The quantity of iron used in this work, was not less than 80 tons, and of wood, 135 tons.

The weight sustained by the two main wire stays is 120 tons, and it is calculated to sustain the amazing and enormous weight of 2,400 tons. [*Lond. Mech. Mag.*

¶ *On the Practice of the Blow Pipe.*

The introduction of the use of the blow pipe in practical chemistry, may be regarded almost in the same light as the application of the power of steam to the purposes of commerce. If the latter has increased our national resources, and forwarded the interests of mechanical science, by economising the labour and expenditure which were formerly bestowed, the former has, in like manner, advanced the cause of chemistry, and its dependent sciences, by reducing the expense of fuel, time, and material, which were originally required in qualitative analysis. If the mechanic can now produce, with comparative ease and expenditure, an article which, before the introduction of the steam engine, would have required the labour of many weary days, and the consumption of much valuable material,—the modern chemist can, with equal facility, detect the constituent principles of a body, which, before the invention of the blow pipe, would have called in requisition the unremitting exertions of many tedious nights, and the profuse employment of many rare, and, perhaps, valuable substances. In fact, by the introduction of this simple, yet invaluable instrument, the modern chemist can, by his parlour fireside, and with a common candle, perform those operations, to accomplish which, the ancient and less gifted philosopher would have been compelled to resort to the unhealthy atmosphere of a laboratory, and the continued poring over an intensely active fire. The blow pipe,

according to Bergman, had been long employed in the arts by jewellers and others, for the purpose of soldering, before it was applied to the purposes of analytical chemistry and mineralogy, by a Swedish metallurgist, of the name of Sual, about the year 1733. This individual, however, appears to have left no written account of the method which he adopted in the application of this instrument. The researches of Cronstedt, Bergman, and Gahn, and, more recently, those of Berzelius and Faraday, have concurred in raising this instrument to the eminent station of utility which it at present enjoys. In the work of Berzelius on this subject, will be found ample instructions for the pursuit of mineralogical and analytical chemistry; and in the "Chemical Manipulations" of Dr. Faraday, the student will meet with copious directions for applying this instrument in the bending and blowing of glass, in practical chemistry. For the former purpose, the mouth blow pipe possesses undeniable advantages; but for the more fatiguing operations of the latter, the table, or hydrostatic, blow pipe will be found convenient. The advantages possessed by the mouth blow pipe over all those instruments whose blast is produced by artificial means, consists in its portability, economy, and the facility of immediately suspending or modifying the blast. "The chemist does not possess," says Dr. Faraday, "a more ready, powerful, and generally useful instrument, than the mouth blow pipe, and every student should early accustom himself to its effectual use and application."

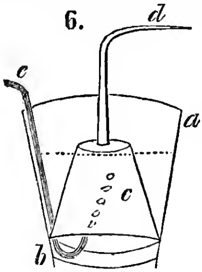


The supply of a *continued* stream of air, is the chief difficulty which a beginner experiences in learning the use of this instrument, and this difficulty is, I apprehend, not unfrequently increased by the employment of a blow pipe with too large an orifice, in the first instance. The following method of constructing, will, I have reason to believe, be found more efficacious than any other hitherto published, since I have, by its means, succeeded, in less than half an hour, in communicating the art of blowing to a class of several persons. Let the pupil procure a tube of glass, *b e*, about thirteen inches long, and of the size and thickness of *a*. Let him now thoroughly heat the tube at *c*, about two inches from the end, by slowly turning it round in the flame of a candle, or, what is better, a spirit lamp. When he finds that it will yield, let him bend it gradually till it has acquired the position represented by fig. 2. The part *d* is now to be heated in the same manner, till it is found soft enough to draw out, when the part *e* must be gradually withdrawn, as represented in fig. 4, till it terminates in a

point; this point should be held for a minute or two in the point of the flame, in order to thicken it, and when cold it is to be ground away with a file, until the smallest possible orifice is visible. The pupil will now be possessed of a blow pipe (fig. 3) with an exceedingly minute jet; and if he puff out his cheeks to the utmost, and place the end *b* within his lips, while the other extremity is held within a short distance of a candle, (fig. 5,) he will, after a few trials, find no difficulty in keeping the flame *continually*, and *without intermission*, horizontal and clear. The operation which he will be required to perform, in order to keep his cheeks constantly distended, notwithstanding the escape from the jet, cannot easily be described, but will naturally offer itself when the expenditure of air is very small. When the pupil has succeeded in keeping up a constant blast for several minutes, by this means, he may enlarge the aperture by degrees, practising between each enlargement, till he finds he can manage a blow pipe with a large bore, when he should purchase one of brass, with an ivory or tinned mouth-piece, for general use.

Among the numerous hydrostatic blow pipes which have already appeared in your Magazine, the pupil who wishes to manufacture his own apparatus, may assuredly find one which will form a substitute for the table blow pipe. I subjoin a plan for one, which may be constructed, at a trifling expense, by almost every student, and in situations where the articles or workmanship requisite for the construction of a more complicated machine, could not be procured. *a b* (fig. 6) is a common pail, about half filled with water; *c* is a large flower pot, inserted, and fastened in by any convenient method; *d* is a mouth blow pipe, (glass would do on an emergency,) fastened in air-tight, with a cork and lute, to the hole at the bottom of the flower pot; *e* is a bent tube of glass, or metal, terminating under the mouth of the flower pot. When air is blown in from the mouth at *e*, it rises into the body of the internal vessel, and displaces the water, which, in endeavouring to regain its level, forces out the air from the jet of the blow pipe, with a force proportioned to the height of the column of water displaced. [*Lond. Mech. Mag.*

6.



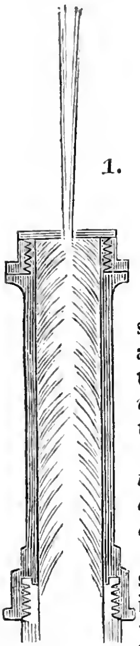
¶ *Singular Hydraulic Phenomenon.*

"The motion of fluids, and the friction and other causes by which it is impeded, forms one of the most elaborate and abstruse branches of mathematical philosophy."—*Prof. Millington.*

While some comparative trials were being made between some engines belonging to the London Fire Establishment, opportunity was taken of ascertaining the effect of a short cylindrical branch-pipe, which consisted of a straight metal cylinder, twelve inches long, closed at the top by a flat brass cap, having a circular opening in its centre, seven-eighths of an inch in diameter. Previous to the

employment of this kind of branch-pipe, I had foretold an unfavourable result, from the interference of opposing currents, but must confess I was by no means prepared for what followed, which was of so extraordinary a nature as to surprise all the persons who witnessed the phenomenon.

1.



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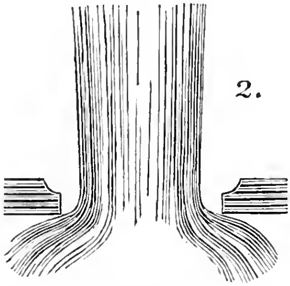


When the engine first began working, a jet of water, seven-eighths of an inch in diameter, issued from the aperture in the cap of the branch-pipe, but as soon as the men got in full work, *the stream of water diminished in size*, and appeared to correspond very nearly with that delivered by a five-eighths nose-pipe.

On a close and careful examination, it was found *that the jet of water did not much exceed five-eighths of an inch in diameter*, and that it issued *without touching any part of the aperture in the cap!*

This effect is represented as taking place in the section, figure 1, which is drawn on a scale of two inches to a foot; figure 2 is a section of the aperture in the cap of the branch-pipe, with the jet of the full size, which shows very accurately what took place. The stream of water appeared to be very much pinched all round; it presented a somewhat irregular surface, and was very much divided at the end of its range.

In fig. 1, I have endeavoured to represent the currents which would appear to be concerned in producing this singular effect; it seems as if the particles of water striking against the flat surface of the cap, were deflected towards the orifice from all sides, and pinched the jet, so as to cause the contraction that was observed to take place.

In using branch-pipes of the usual taper form, when particles of air escape with the jet of water from the nose-pipe, a loud *popping* sound is always produced; but with the cylindrical branch, the noise in such case produced was strikingly different, being a *sharp cracking, or snapping, sound.*

Apparatus of a similar kind to the above has been tried before, but the singular phenomenon I have described appears to have escaped observation.

The issue of fluids from apertures of various kinds, under the influence of gravitation alone, with the nature of the currents supposed

to exist, have been investigated by Newton, Bernoulli, Venturi, and many others; but the nature and properties of jets urged by great pressure, does not appear to have occupied much attention.

This subject offers a wide field for investigation; I shall avail myself of the occasional opportunities kindly afforded me of examining this matter, and communicate such new facts as may be elicited.

In the meantime, should any of your numerous correspondents have had the opportunity of noticing any facts bearing upon this particular branch of science, I shall be most happy to be made acquainted with the same, through the medium of your pages.

Yours,

Wm. Baddeley.

London, March 18, 1835. [*Ibid.*

¶*Patent Bronze Sheathing.*

There has been delivered this week to his Majesty's Dock-Yard here, a quantity of the *Patent bronze Sheathing*, and directions have been given by the Lords of the Admiralty to sheathe two of the Falmouth packets that may next require coppering, one side with the patent bronze, and the other with copper, so that a comparison may be fairly established of the duration of the two substances.

We have been favoured with an inspection of a sheet of the bronze, and certainly it is a most beautiful specimen of manufacture. But notwithstanding its density and polished surface, it is at the same time quite malleable and pliant.

The subject, we are aware, is one of great interest, and we have therefore collected the following details relative to this new invention, which we understand originated with a French engineer, and was first tried in the French navy in 1829; since which, on account of its superior durability, ascertained by repeated experiments, the French government has contracted for several hundred tons a year. In every instance it has been found to keep quite *clean*, a point of paramount importance, whilst from its superior hardness, it is not so liable to be rubbed in case of a vessel taking the ground or running foul.

The durability of ancient bronze coins, medals, and utensils, has long excited attention; numerous specimens are found in Egypt, Greece, and Italy. The famous horses of St. Mark, at Venice, are a remarkable instance of preservation; but it was never thought practicable to render such a hard and dense metal malleable so as to con vert it into sheets. The beautiful specimen we have seen, proves that this difficulty has been at last overcome.

We are informed that the usual composition of the bronze of antiquity, was copper combined with six to ten per cent. of tin. Bronze is in fact copper hardened, and rendered less liable to oxidation, by the addition of tin.

The wear of copper on ship's bottoms is a mechanico chemical action, inasmuch as its waste at sea is six and a half times greater than in harbour. We should conclude, therefore, *a priori*, that a hard

metal, like bronze, would waste less by the friction of the water, than a soft metal, like copper; and the greater duration of ancient bronze, proves that it is less oxidable. There would thus be established a superiority in resisting mechanical as well as chemical action in favour of the bronze. The result of the experiments made in the French navy on bronze sheathing, *very imperfectly manufactured,* as stated in the "Annales Maritimes" for 1830, '31, and '32, goes to prove that when applied to ships' bottoms, the loss in weight of the bronze is less than half that of copper.

It appears now established, that a continued and necessary wasting of the metallic sheets alone secures a clean bottom, and that no galvanic protection is compatible with it, fresh surfaces of the metallic sheets must constantly be presented by the washing away of the scale or oxide; every thing that attaches to the bottom in calms or in harbour, whether seeds of marine plants, or spawn of animalculae, is thus undermined and carried off, leaving the sheathing bright and clean. With the bronze, as with copper, the same continuous wasting is going on, but *with one half of the loss in weight,* owing to its greater hardness and density, and its inferior oxidability. Lead, zinc, etc. foul on ships' bottoms, not because their oxides are less poisonous than that of copper, but because, instead of being washed off, their oxides are *adhesive,* and eat, (if we may so express ourselves,) into the sheets, thus allowing whatever fastens on the bottom to remain there and increase. Sir H. Davy's protected copper failed for the same reason—there was no oxide formed, the copper did not waste at all, and thus became foul.

There is, however, one obstacle, to the general use of bronze which those who like cheap articles will hardly get over, namely it is 2d per lb. dearer than copper, which the English patentees, Messrs. Vivian & Sons, state they are obliged to charge to cover the great extra expense of rolling so hard and dense a metal into sheets, and the patent right; but we apprehend, if on trial the bronze, instead of giving double the wear of copper, gives only one half more, or as four years and a half to three years, this additional first cost will be trebly repaid to the ship-owner, as nothing is so vexatious and expensive as putting a ship into dock to get her re-coppered, when she does not require other extensive repairs. On whaling, and other distant foreign voyages, the longer duration of sheathing is a great desideratum. Even the first outlay may be eventually reduced by the use of bronze sheets eighteen or twenty ounces to the foot, instead of copper sheets of twenty-eight or thirty ounces per square foot.

Nearly the whole of the whaling and India ships from Havre are sheathed with bronze, and several have returned from these long voyages with their bottoms perfectly clean, and the sheathing very little worn. It is now extensively in trial on ships from London, Liverpool, Greenock, etc., so that the results obtained in France will soon be severely tested in this country.

We find we have omitted to notice a point of great importance in the sheathing for ships' bottoms, which is, that the wear should be uniform over the whole surface of the sheets. It is well known that

copper sheathing is greatly subject to be corroded into holes, and this especially happens when a vessel has been for some time in ordinary at her moorings, so that the sheathing often becomes unserviceable from this cause, although its total loss in weight is very small. This occurred in two instances in the trials made by the French navy, where one side was covered with copper and the other with bronze. Although the vessels had not been out of harbour, they were obliged to take off a considerable part of the copper, whilst the bronze sheathing was quite perfect, having worn uniformly over the whole surface.—*Plymouth Herald.* [*U. S. Mil. & Nav. Mag.*

¶ *Extracts from a Lecture on the Preservation of Timber by Kyan's Patent for preventing Dry Rot: delivered by Doctor* Birkbeck, *at the Society of Arts, Adelphi; December* 9, 1834.

We have heard persons assert that it appears to them almost ridiculous to suppose that it ever can become necessary, on a large scale, to perform any operation with a view to render timber durable, beyond that of properly seasoning it by exposure to the atmosphere. But is not this mere prejudice? Why should not timber be prepared by a particular process, which conveys something additional into it, and thereby effects a chemical change in its nature, as well as leather is tanned?

"A very effectual procedure has taken place, in regard to one form of animal matter, by the preservation of the skin from natural decay in a process known by the name of 'Tanning.' This process will give a very good idea of Mr. Kyan's invention. Tanning consists in protecting the leather and skin by the introduction of tannin, which is generally derived from an infusion or decoction of the bark of the oak. If no change were produced in the gelatine, which makes the largest part of the skin to be immersed in the tan-pit, it would undergo certain chemical changes—it would putrefy, and lose its tenacity; but if a portion of animal jelly is dissolved in water, and a little of the substance added, similar to the tannin, a combination will take place between the gelatine; a precipitate will follow of the animal matter, which is the tanno-gelatine, or a compound of tannin and gelatine, and is precisely that substance which is formed in the leather, and gives to it durability and power to resist the causes of decay. The same intention exists in the process of Mr. Kyan. It is true he does not act on the gelatine of animal matter, but he does on the albumen: one of the approximate principles of vegetable matter, which appears to have been slightly perceived by Fourcroy, but which was actually discovered by Berzelius, about the year 1813.

"In order to obtain this vegetable matter (*albumen,*) there are various substances which may be employed. The Hibiscus esculentus yields it in considerable abundance: it is a West Indian plant, which Dr. Clarke mentions as adopted in Demerara, for the same purpose, as, in other Islands, the white of eggs and blood are employed in the process of clarifying sugar. The ficus indica, also, if divided at the stem, will exude a considerable quantity of this matter. If the solution of

the bichloride of mercury (which is the agent adopted by Mr. Kyan) is added to the vegetable matter, albumen, it will be found, when they come in contact, that decomposition occurs."

"Mr. Kyan, who had been a series of years (since 1812) engaged in trying a variety of experiments on the preservation of timber, was led to the present experiment by having, as he conceived, at length ascertained that *albumen* was the primary cause of putrefactive fermentation, and subsequently of the decomposition of vegetable matter. Aware of the established affinity of corrosive sublimate for this material, he applied that substance to solutions of vegetable matter, both acetous and saccharine, on which he was then operating, and in which albumen was a constituent, with a view to preserve them in a quiescent and incorruptible state, and obtaining a confirmation of his opinions by the fact that, during a period of three years, the acetous solution openly exposed to atmospheric air had not become putrid, nor had the saccharine decoction yielded to the vinous or acetous stages of fermentation, but were in a high state of preservation; he concluded that corrosive sublimate, by combination with albumen, was a protection against the natural changes of vegetable matter."

"The mode in which the application of the solution takes place, is in a tank similar to the model on the table. They are constructed of different dimensions, from 20 to 80 feet in length, 6 to 10 in breadth, and 3 to 8 in depth. The timber to be prepared is placed in the tank, and secured by a cross beam to prevent its rising to the surface.—The wood being thus secured, the solution is then admitted from the cistern above, and for a time all remains perfectly still. In the course of 10 or 12 hours the water is thrown into great agitation by the effervescence, occasioned by the expulsion of the air fixed in the wood, by the force with which the fluid is drawn in by chemical affinity, and by the escape of that portion of the chlorine or muriatic acid gas which is disengaged during the process. In the course of 12 hours this commotion ceases, and in the space of 7 to 14 days (varying according to the diameter of the wood) the change is complete, so that as the corrosive sublimate is not an expensive article, the albumen may be converted into an indecomposable substance at a very moderate rate."

After stating the result of various experiments, Dr. Birkbeck concludes by observing that this discovery is yet in embryo, but that the public benefit that will result from it is beyond calculation. In an *Appendix* the various purposes to which the process is applicable are detailed: such as preventing dry rot, seasoning timber, protecting from insects, applying the process to Canada and British timber, and preserving canvass, cordage, &c. from mildew.

"Canada timber is much more liable to decay than that grown in the northern parts of Europe, and for this reason is never used in buildings of a superior description. The principle of decay being destroyed, as above shown, this objection is no longer in existence; and this kind of timber may now be employed with as great security as that of a superior quality and higher price.

"The same observation applies with great force to timber of Bri-

tish growth, particularly to that of Scotland, much of which is at present considered of very little, if any value for durable purposes, on account of its extreme liability to decay, whether in exposed situations or otherwise. The present process will therefore render of considerable value, plantations of larch, firs of all kinds, birch, beech, elm, ash, poplar, &c., which are the chief products of the great wooded estates, and which, when prepared, may be advantageously employed to most useful purposes."

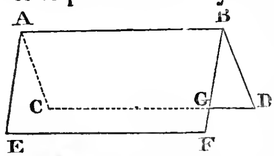
"*Purposes for which the Prepared Timber, &c., would be highly useful.*—Houses, farm-houses, out-houses. Large timbers, floors, roofs, gutters, &c., furniture, and all joiner's work, preserved from dry rot, and perfectly seasoned. Posts, rails, gates, park paling, fences, hop-poles, felloes, spokes, shafts, &c. &c. For these purposes any kind of timber may now be used, instead of the more expensive kinds. It will also supersede, in many cases, the employment of iron, from its acquired durability and greater economy."

The additional expense of preparing timber for buildings, such as farm-houses, out-houses, &c. in Mr. Kyan's manner is estimated at the very moderate sum of 20s. per load. [*Arch. Mag.*

¶ *On the Resistance of Fluids; by* Geo. W. Keely, *Prof. of Natural Philosophy, in Waterville College.*

Sir:

I perceive in No. 55 of the Journal, that Prof. Wallace has announced a new measure of the resistance of a fluid in a direction perpendicular to a plane surface moving in it: viz. That it is as the sine of the inclination of the plane. Permit me to state my reasons for adhering to the old doctrine, that the perpendicular resistance is as the square of the sine of inclination. It is well known that the latter measure has been deduced from the alleged facts that the *number* and the *force* of the resisting particles vary as the sine of the inclination. If it be true that the resistance to a plane surface moving in a fluid is as the number of particles it strikes in its course, and that the number of particles in any indefinitely thin fluid lamina is as the area of



that lamina, (neither of which we think Prof. W. will deny,) it follows that, if BD be a section of a plane inclined to the direction BA of its motion, and BF an equal section of an equal plane perpendicular to the same direction, the number of particles BD will strike is to the number that BF will strike in the same time, as the parallelogram ABCD is to the parallelogram AEFB; and the resistances are therefore, on this account, as BG is to BD, or as the sines of the inclinations of the sections; the resistances to the planes are of course in the same ratio.

Now this familiar demonstration would seem to settle the question; but Prof. Wallace argues, "that the number of particles striking the plane does *not* depend on the breadth of the fluid column BG BF, but *on the surface of the plane,* because the particles that act on the plane

are those in contact with it, and therefore their number is as its superficial area." Now admitting it to be true that the number of material particles in contact with the plane, at any instant, is the same, whether it be perpendicular or inclined to the direction of the motion, it does not, we think, necessarily follow that the number of particles struck in any given time will be the same. But neither is it evident that the number of particles in contact with the plane is the same for every inclination of the plane. The burden of proof, however, seems to lie with Prof. W. He has *assumed* the general physical fact that the number of particles in contact with the plane, at any instant, is the same for any position of the plane, and he has deduced an inference, not formally expressed, indeed, but surely implied, otherwise the argument is worth nothing, that the number of particles struck in any given time is as the number in contact with the plane at any instant. Now we think the fact and conclusion may very safely be denied, and it becomes Prof. W. to shew that they are consistent with some hypothesis respecting the form and relative position of the ultimate particles of a fluid body. In any hypothesis, we believe the following positions will be found to hold:

First. Whether the number of particles, at any instant, in contact with the plane, in different positions, is the same, depends wholly on the hypothesis.

Second. If the number is the same in different positions, it will be found that the number of fluid strata struck in any given time is as the sine of the inclination.

Third. If the number is *not* the same, then it varies as the sine of the inclination, and the number of strata struck will, in any given time, be the same.

If Prof. W. can devise any hypothesis with which these positions do not agree, we will allow he can disturb our belief in the truth of the law of the square of the sines.

The wide difference between the results of observation and those of the old theory, would tend rather to dissuade us from admitting the truth of the new, when we consider what important physical circumstances are and must be omitted in the conditions.—*Silliman's. Jour.*

¶ *The Bleaching Mania; from a Lecture delivered before the Chelmsford Mechanics' Institute. By* John Murray, Esq. F. S. A., &c.

Chlorine (from a Greek word signifying green) is the characteristic name given to a gas discovered by Scheele, in 1774, and called by him *dephlogisticated marine acid gas.* It was some time ago more generally known by the name of oxymuriatic acid gas, from a presumption (now considered to be erroneous) that it contained oxygen; and among manufacturers it goes by the name of the bleaching gas. The mode of obtaining it is very simple. We take black oxide of manganese and mix it with a small portion of muriatic acid, in a glass retort, and on the application of heat the chlorine is evolved. Either alone, or in combination with lime or magnesia, it may be, and is, employed for bleaching paper. I have no objection to its being used

by the manufacturer in bleaching his linen and calico, but against the practice of bleaching paper I do protest. The consequences of thus using chlorine—which has the property of destroying ink and other colours—are, that many valuable epistles become illegible, and some have even dropped to pieces on the road. Some of our best modern books are already tottering on their shelves; and numerous deeds and valuable writings, requiring to be kept a great number of years, will, ere a very few, become useless. I have in my possession the remnant of a royal octavo volume, one of an edition of 30,000 copies, printed at the University press in 1818, and it is a singular fact, that there is not a perfect copy now existing. We find that when any thing of a delicate colour is wrapped up in white paper the colour is destroyed. A silk manufacturer once told me he could not perserve his coloured silks; he used the whitest and cleanest paper he could procure to wrap them in, but the colours invariably faded, I told him for the future to wrap them in common coloured, or brown, paper—he did so, and the silks retained their delicate hues. Paper stainers have lost hundreds of pounds in value, in consequence of the destruction of their goods by chlorine. This gas has also the property of dissolving gold. I knew a button merchant, who sent a quantity of gilt button to London for sale; being an expensive article, he took care to have them securely packed in white paper that they might be kept perfectly clean. The consequence was that the gilt corroded, and the buttons were returned unsaleable. Every thing now-a-days—such is the rage for bleaching—must be bleached. Our linen must be bleached, though by that means we render it yellow; our calico must be bleached; our ginger must be bleached, although at the expense of destroying the very principle which renders it valuable; and by-and-bye, I suppose, we shall be bleaching our daily bread. Let us, however, view the case as we ought. If we have an inferior article, paper for instance, the fault is ours, not the paper makers.

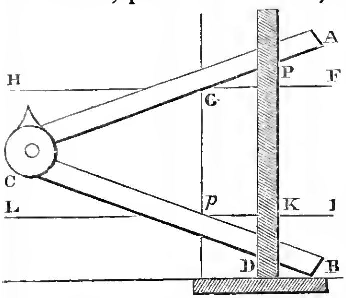
We fix our prices, and if I am determined to have a quire of paper for 4d. the manufacturer knowing he cannot furnish it of sterling quality, is obliged to resort to the expedient of bleaching, for the purpose of giving a good exterior to a bad material. Perhaps the subject may be illustrated this way: Suppose I want a pound of confectionary, Iwalk into the confectioner's, and say, "if you let me have it for 4d. I'll take it, and if not, why I can obtain it elsewhere;" never, for a moment, recollecting that the very materials, or perhaps merely the sugar, costs double the sum. The consequence of this mode of proceeding is, that we have the privilege of swallowing with our confectionary a sufficient quantity of chalk. To such a pitch has the bleaching of paper been carried, that Government find themselves obliged to employ a person to watch the manufacture of the paper they require, for the purpose of securing it of a good quality. I know of two cases in which letters containing money have fallen to pieces by the road. One was directed to the post master of Sheffield, and it so happened that the check was found in the post bag—the person for whom the other letter was intended, was not so fortunate. Every

thing is now made up into paper, and in consequence of its being bleached, we do not so easily detect the inferiority. I have by me specimens of paper made not only from wool and leather, but from the bark of the willow, from hay and straw, potato peelings, wood shavings, saw dust, and in short, any thing can be made into paper, *such as it is.* [*Lon. Mech. Mag.*

¶ *Simple Perspective Delineator.*

Sir,—It is a considerable time since I discovered, and reduced to practice, a ready method of putting plans into perspective, without drawing the usual lines, without finding vanishing points, and without any other trouble than using a very simple instrument with a little care. The following is a representation of the instrument, which is cheap, and is sold by the author.

Let A C B be a variable angle, to move in every position; H F a line for the plane of the picture; and L I a ground line parallel to it; other lines, parallel to the last, may be drawn for different elevations.



Let P be any point whose perspective is required; place C A at P, and also a T square, whose side is P D; this done, move the leg C B until the line, I K, falls in the angle P K B; now move the T square into the position G p, so that the line G F comes into the angle A G p; then the point p, so found, will be the perspective of P. The principle upon which the instrument is constructed is, that the elements of perspective depend solely upon similar triangles.

In the year 1821, I invented and made public that description of horizontal perspective called by me the Horizontorium. The demand for it was such that it was sent for from all parts, and continued in request for four years. Very recently, this very invention has been reproduced by persons who would fain persuade the public that it has just come from France. Some have done even worse than this, for they have published new ones on false principles, and painted them in a manner which is a disgrace to science; any person desirous of seeing a specimen of this has only to look in at the Pantheon, in Oxford street. The horizontorium has nothing beyond common about it; the only peculiarity being that the view is projected on a horizontal plane, in lieu of a vertical one. One eye only should view the picture, and that eye be guided by a hole in a card. The same should be done in viewing every perspective representation, let its plane of projection be what it may. I am, &c.

W. Shires.

[*Ibid.*

¶ *Mode of Preserving Milk for Long Voyages.*

Provide a quantity of pint or quart bottles, (new ones are perhaps best;) they must be perfectly sweet and clean, and very dry, before they are made use of. Instead of drawing the milk from the cow into the pail, as usual, it is to be milked into the bottles. As soon as any of them are filled sufficiently, they should be immediately well corked with the very best cork, in order to keep out the external air, and fastened tight with packthread, or wire, as the corks in bottles which contain cider generally are. Then, on the bottom of an iron or copper boiler, spread a little straw; on that lay a row of the bottles filled with milk, with some straw between each, to prevent them from breaking, and so on alternately, until the boiler has a sufficient quantity; then fill it up with cold water; heat the water gradually until it begins to boil, and as soon as that is perceivable, draw the fire. The bottles must remain undisturbed in the boiler, until they are quite cool; then take them out, and afterwards pack them in hampers, either with straw or sawdust, and stow them in the coolest part of the ship. Milk preserved in this way has been taken to the West Indies and back, and, at the end of that time, was as sweet as when first drawn from the cow. [*Ibid.*

¶ *New Metallic Cement.*

A new metallic cement, for which a patent has been taken out, consists of powdered scoria from the copper works, mixed with stone and lime. It sets rapidly, and takes a fine metallic polish. It is now being used by Messrs. Harrison, in a large building intended for an inn, at the south-west corner of London Bridge. This cement, unlike all other kinds except Frost's, is sold mixed up ready for use. The price is 9*d.* per bushel. If the scoria, in a state of powder, were sold by itself compressed in casks, it appears to us that it would form a very desirable cement for exportation. It may be laid on in coats as thin as the fourth of an inch, but it has not been a sufficiently long time in use to determine to what extent it will crack.

[*Ibid.*

List of American Patents which issued in June, 1835.—(*Continued.*)

		June
379.	*Loom for figured work.*—E. Meily, Jr. and J. & S. Mellinger, Lebanon, Pennsylvania, ...	26
380.	*Saddles.*—A. L. Vanhorn, Philadelphia,	26
381.	*Hulling clover, &c.*—John Whiteman, Philadelphia,	26
382.	*Rotary steam engine.*—Charles Hill, Zanesville, Ohio,	26
383.	*Ever-pointed pencils.*—Elwood Mears, Philadelphia,	26
384.	*Churns.*—Isaac Wood, Connersville, Indiana,	26
385.	*Mills for grain, &c.*—William S. Johnson, city of New York,	26
386.	*Corn planting machine.*—Thomas D. Burrall, Geneva, New York,	26

387. *Roofs, metallic.*—John Bonis, city of Baltimore, 26
388. *Flask for casting kettles, &c.*—David Stewart, Danville, Pa. 26

List of American Patents which issued in July, 1835.

July

389. *Coopers' ware, making.*—Isaac Hoover, Miamisburg, Ohio, 2
390. *Stove.*—Augustin G. Ernst, city of New York, 6
391. *Straw cutting.*—Augustin G. Ernst, city of New York, 6
392. *Shoes, water proof.*—Augustin G. Ernst, city of New York, 6
393. *Vinegar, making.*—Frederick W. Boden, city of New York, 6
394. *Combing Wool.*—Samuel Couillard, city of Boston, 7
395. *Roots, cutting.*—Jonathan Clark, Hampton, Connecticut, 7
396. *Horse power.*—Thomas Mitchell, New York, 7
397. *Steam, accidents from, preventing.*—George R. Clarke, Rochester, N. Y. 7
398. *Wool, cleaning from burs, &c.*—Michael H. Simpson, city of Boston, 7
399. *Thrashing machines.*—Joseph Tyler, Brooklyn, New York, 7
400. *Water pumps.*—Amos Miner, Jordan, New York, 7
401. *Fulling mill stocks.*—E. S. Norris, Monmouth, Maine, 7
402. *Locks and latches.*—Albert Bingham, Unity, Maine, 7
403. *Piano fortes.*—Thomas Loud, city of Philadelphia, 7
404. *Mortising machine.*—Israel J. Richardson, Palmyra, N. Y. 7
405. *Mills.*—George & F. R. Baker, Tuscaloosa, Alabama, 7
406. *Chisels.*—George Page, Keene, New Hampshire, 7
407. *Linseed oil, substitute for.*—S. J. Todd & J. L. Beabody, Washington city, ... 7
408. *Saw mill.*—Augustin G. Ernst, city of New York, 17
409. *Felloes, bending.*—Edward Reynolds, Haddonfield, New Jersey, 17
410. *Cultivator.*—Daniel Davis, Fredericksburg, Virginia, 17
411. *Rollers for curtains, &c.*—Henry Lawson, city of Boston, 17
412. *Churn.*—Oliver Wyman, Dedham, Massachusetts, 17
413. *Stoves, cooking.*—John Moffat, and Morton Taintor, Buffaloe, N. Y. 17
414. *Potash, manufacturing.*—H. Hartsuff & C. French, Aurelius, N. Y. 17
415. *Mortising machine.*—Imla Wright, Center Antrim, N. H. 17
416. *Water wheels.*—Isaac Powell, Laurens, New York, 17
417. *Plough.*—Timothy Miller, Pittsburgh, Pa. 17
418. *Weavers' reeds, headles and harness.*—J. A. Wilkinson, Providence, R. I. 17
419. *Looms.*—Oliver C. Burr, Millbury, Massachusetts, 17
420. *Churn floats.*—Reding Ryerson, Jay, Oxford county, Maine, 17
421. *Plough.*—Samuel Clime, Plumsted, Bucks county, Pa. 17
422. *Washing machine.*—Asa W. Soule, Portland, Maine, 18
423. *Coffins of cement.*—John White, city of New York, 18
424. *Cloth, manufacturing.*—Freeman Wolcot, Stow, Massachusetts, 21
425. *Corn shelling.*—John P. Small, Gilmanton, New Hampshire, 21
426. *Stove.*—Jordan L. Mott, city of New York, 21
427. *Corks, cutting.*—J. Cutler and I. Keyes, Putney, Vermont, 21
428. *Stoves.*—Jordan L. Mott, city of New York, 21
429. *Knobs and handles for stoves.*—Jordan L. Mott, city of New York, 21
430. *Churning.*—Hiram Phelps, Williston, Vermont, 21
431. *Fireproof chests.*—John Scott, city of Philadelphia, 21
432. *Slide valves.*—Andrew M. Eastwick, city of Philadelphia, 21
433. *Rotary steam engine.*—Mason Young, Buffaloe, New York, 21
434. *Tenons, cutting on spokes.*—William Gerrish, Portsmouth, N. H. 21
435. *Churn.*—Russel Bradley, Williston, Vermont, 21
436. *Stoves.*—David West and Ferdinand Van Sielen, Hudson, New York, 21
437. *Churn.*—William A. Herrick, Greene, Maine, 21
438. *Paper rags, cleaning.*—William Debit, Hartford, Conn. 21
439. *Height of water in boilers.*—Jesse Fox, Lowell, Mass. 21
440. *Height of water in boilers.*—Jesse Fox, Lowell, Mass. 21

CELESTIAL PHENOMENA, FOR OCTOBER, 1835.
Calculated by S. C. Walker.

Day.	H'r.	Min.					
6	7	5	Im.	f Piscium,	,6,	N. 133°	V. 83°
6	8	15	Em.			293°	246°
30	7	12	Im.	τ' Aquarii,	,6,	130°	119°
30	8	34	Em.			298°	305°

Meteorological Observations for June, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	74°	77°	29.70	29.80	W.	Moderate.		Clear day.
	2	55	80	.90	.94	W.	do.		Clear day.
	3	67	87	.94	.97	SW.	do.		Lightly cloudy.
☾	4	68	85	.87	.87	SW	Brisk.	0 68	Cloudy—clear—rain.
	5	67	81	.70	.70	SW.	do.		Cloudy—lightly cloudy.
	6	65	80	.70	.80	NW.	do.		Clear—lightly cloudy.
	7	63	75	30.00	30.15	NE.	do.		Cloudy—clear.
	8	51	75	.30	.25	NW. SE.	Moderate.		Clear day.
	9	52	76	.15	.05	W. SW.	do.		Clear day.
☺	10	67	85	29.95	29.90	SW.	do.		Fog—clear.
	11	63	86	30.00	30.00	E. SE.	do.		Fog—cloudy.
	12	73	85	29.95	29.95	S.	do.		Cloudy—rain.
	13	68	83	.80	.80	W.	do.	0.15	Cloudy; flying clouds; rain in night
	14	71	80	.83	.80	SE.	do.	0.10	Cloudy—rain.
	15	53	71	30.00	30.00	NE.	do.		Cloudy—flying clouds.
	16	56	72	29.90	29.83	W.	do.		Cloudy—lightly cloudy.
☽	17	60	73	.80	.75	W.	Brisk.	0.13	Lightly cloudy—rain.
	18	53	76	.80	.80	W.	do.		Clear—lightly cloudy.
	19	63	77	.65	.60	SW.	do.		Cloudy—lightly cloudy.
	20	57	69	.54	.61	W.	do.		Clear—flying clouds.
	21	56	65	.83	.83	NW.	do.		Clear day.
	22	50	73	.83	.83	W.	do.		Clear day.
	23	57	73	.85	.85	W.	do.		Clear day.
	24	63	83	.85	.85	W.	do.		Lightly cloudy—clear.
⊗	25	63	65	.85	.85	SW. S.	Moderate.		Cloudy—rain.
	26	62	67	.75	.75	NE. SE.	do.	0.88	Cloudy; rain; thunder & lightning.
	27	66	78	.75	.70	SE.	do.	0.50	Fog; flying cl'ds, rain in n't, thund
	28	60	79	.64	.60	SW.	do.	1.20	Clear; shower of hail & rain, wind
	29	58	75	.60	.60	W.	Brisk.		Clear, flying cl'ds. [thun. & light'g
	30	62	68	.60	.60	W.	do.		Cloudy—flying clouds.
	Mean	61.23	76.63	29.83	29.83			3.64	

	Thermometer.	Barometer.
Maximum height during the month,	87. on 3d.	30.30 on 8th.
Minimum do. .	50. on 21st & 22d.	29.54 on 20th
Mean do. .	68.93 .	29.83

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

OCTOBER, 1835.

Essays on Calcareous Cements. By James Frost, *Esq., Civil Engineer, New York.*

TO THE EDITOR OF THE JOURNAL OF THE FRANKLIN INSTITUTE.

Sir:

Having many years since, in my native country, [England,] formed various calcareous cements, of a beautiful colour, by a new process, which cements appeared to be very hard, and to become more so, I was desirous of comparing them with other hard substances, and of obtaining, if possible, their relative value, without injuring the specimens. This object was satisfactorily attained by abrading them, by means of fine emery and water, against a standard piece of white statuary marble, and calculating their relative hardness from the weight lost by each substance in the operation.

It soon became evident that the term strength would better define the result than the term hardness, which being an abstract quality, always in combination with another abstract quality, tenacity, jointly constitute strength, by which all change of form is resisted. Statuary marble was used as the test for all substances, from brass to work stone, inclusive, which latter substance was used to test the weaker articles, while the stronger were tested in succession with each other.

As another attempt to obtain similar information was recorded in the Annals of Philosophy, by Mr. Bevan, in the numbers for March

and April, 1831, and as that gentleman operated on some of the same substances by percussion, and obtained thereby somewhat different results, a careful consideration of the two modes employed seems to indicate that percussion is rather a measure of tenacity, and abrasion a measure of hardness.

In measuring the minute differences of hardness in substances nearly similar, abrasion is evidently the only means of obtaining satisfactory results.

I shall defer the details relative to the strength of calcareous cements, which it is my intention hereafter to furnish, only stating, that I possess a collection ranging from 1 to 580; but I shall, in due course, enter fully on these curious and important distinctive properties. I shall thus place at your disposal the results of a long course of experiments, made on a large scale, with a view to improve the theory, formation, and useful application, of these interesting substances.

As there are few scientific subjects respecting which there are so many conflicting theories, and, amongst practical men, so many different opinions, you may perhaps consider an attempt at elucidation and improvement worthy the attention of your numerous scientific and practical readers.

Comparative Strength with which various Substances resist Abrasion.

Hard cast-steel,	6014
——— yellow tempered,	3184
——— blue tempered,	1592
Soft gray cast-iron,	1293
Black flint,	1939
Rock crystal,	1600
Aberdeen granite,	980
Broner stoneware,	950
Yellow brass,	675
Wedgewood's evaporating basin,	600
Copper keg,	525
Hard Yorkshire paving stone,	327
Old blue Purbeck "	318
Italian black marble,	260
Forest marble,	200
Common unglazed earthenware,	193
Sienna marble,	177
Kilkenny black marble,	110
Statuary marble,	100
Old Portland stone,	79
Roman cement stone,	69
Roman cement, (12 months old,)	58
Fine grained Newcastle grindstone,	53
Welsh blue roofing slate,	41
Fluor spar,	39
Stock brick,	34

Calcareous spar, (Iceland,)	33
Wirth sand-stone, (Sussex,)	17
Coarse grained Newcastle grindstone,	14
Bath stone, (Oolite,)	12
Chalk at Barton on Humber, (Cawk,)	15
" at Dover, (fossil bed,)	6
Gypsum, uncabined,	5
Plaster of Paris, (3 months old,)	.40
Thames chalk,	.18

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Alloys, Solders, and Amalgams, used in the Arts.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—The following table of the alloys and amalgams used in the arts, has been prepared by Mr. Chaudet, a distinguished and experienced assayer in the mint of Paris, from actual analysis of carefully selected samples. In a few instances, the proportions of the composing metals are not given, for reasons that, in one instance at least, are obvious. This deficiency is more than compensated by the addition of several others, particularly that of the alloys of Palladium, which I have added, in the full persuasion that the whole will be found useful. Yours, &c.

Franklin Peale.

Table of Alloys, Solders, and Amalgams, used in the Arts.

Alloy of Gold Coin.—(French Standard.)			
	Gold,	900	1000
	Copper,	100	
Alloy of Silver Coin.—(French Standard.)			
	Silver,	900	1000
	Copper,	100	
Alloy of "Billon."—(French Standard.)			
	Copper,	800	1000
	Silver,	200	
Alloy of Gold Medals.—(French Standard.)			
	Gold,	916	1000
	Copper,	84	
Alloy of Bronze Medals.*			
	Copper,	92	100
	Tin,	8	
Alloy of Jewellery.—(French Standard.)			
	Gold,	750	1000
	Copper,	250	
Alloy of Silver Plate.†—(French Standard.)			
	Silver,	950	1000
	Copper,	50	

* The medals made from this alloy are cast; they have the advantage of being struck by a few blows of the press, and of wearing a long time.

† The standard here indicated is the best; a second is composed of 800 of silver, and 200 of copper, in the 1000.

Alloy of Gold Coin.—(United States' Standard.)

Gold,	899.22	1000
Copper and Silver,	100.78	

Alloy of Silver Coin.—(United States' Standard.)

Silver,	892.43	1000
Copper,	107.57	

Alloy of Gold Coin.—(English Standard.)

Gold,	916.67	1000
Copper and Silver,	83.33	

Alloy of Silver Coin.—(English Standard.)

Silver,	925	1000
Copper,	75	

Alloy in imitation of Gold.

Copper,	91.00	100½
Tin,	9.50	

Alloy in imitation of Silver.*

Copper,	61.27	106
Zinc,	28.78	
Nickel,	15.13	
Lead,	.82	

Alloy for Cannon.†

Copper,	100	111
Tin,	11	

Alloy for Statues.‡

Copper,	91.40	100
Zinc,	5.53	
Tin,	1.70	
Lead,	1.37	

Alloy for Bronzes and Candelabras.

Copper,	82.00	104½
Zinc,	18.00	
Tin,	3.00	
Lead,	1.50	

Alloy for the Mounting of Fire-arms.

Copper,	80	100
Zinc,	17	
Tin,	3	

Alloy for Cymbals,§ Tam Tams, or Chinese Gongs.

Copper,	80	100
Tin,	20	

* This alloy is the Packfond of the Chinese.

† In this alloy, small quantities of lead and zinc are often found, but they are present by accident.

‡ The proportions here indicated are the result of an analysis of the beautiful bronze statues of the garden of Versailles, which were cast by the Brothers Kellers, celebrated founders employed by Louis XIV.

§ This alloy is very hard; it is annealed by dipping, while red hot, into water, and is then malleable; whilst, if suffered to cool gradually, it is excessively hard; this important fact is due to M. d'Arcet, who has thus furnished the means of fabricating, in France, cymbals, &c., formerly imported, at great cost, from China.

Alloy for Bells.			
	Copper,	75	100
	Tin,	25	
Alloy for the Reflectors of Telescopes.			
	Copper,	2	3
	Tin,	1	
Alloy for Brass for the Lathe.*			
	Copper,	65.80	100
	Zinc,	31.80	
	Lead,	2.15	
	Tin,	0.25	
Alloy of Brass for the Hammer.†			
	Copper,	70.10	100
	Zinc,	29.90	
Alloy for Types.‡			
	Lead,	80	100
	Antimony,	20	
Alloy fusible in Boiling Water.			
	Bismuth,	8	16
	Lead,	5	
	Tin,	3	
Alloy for Plugging Teeth.§			
	Bismuth,	8.	17.6
	Lead,	5.	
	Tin,	3.	
	Mercury,	1.6	
Alloy for Tinning Iron.			
	Tin,	8	9
	Iron,	1	
Alloy used to make Ductile Gold of 18 carats, or 950 milliemes.‖			
	Copper,	990	1000
	Gold,	10	
Alloy for Bells of Mantel Clocks.			
	Copper,	75	100
	Tin,	25	
Alloy for the Pivots of Artificial Teeth.			
	Platinum,		
	Silver,		
Alloy for ditto.¶			
	Palladium,	50	100
	Silver,	50	

* The proportions here indicated having been found by analysis, it is evident that the tin is present by accident.

† This alloy of brass is important, and is due to Mr. Chaudet.

‡ Sometimes a small quantity of copper is added to these two metals.

§ This alloy may be prepared with a smaller proportion of mercury; it melts at 65° of the Centigrade scale.

‖ The previous combination of the alloy is found to produce ductile gold, when the same metals would prove the contrary, if mixed directly.

¶ This alloy is extremely important; it is used for all those purposes in the fabrication of philosophical instruments, for which platinum was formerly ap-

Alloy for the Springs of Artificial Teeth.*

Palladium,	50	160
Silver,	50	
Copper,	50	
Iron,	10	

Solder for Gold of 750, or 18 carats.

Gold of 750,	2.00	3
Copper,	0.50	
Silver,	0.50	

Solder for Silver of 750.†

Silver,	2	3
Brass,	1	

Solder for Brass.

Copper,	50	100
Zinc,	50	

Solder for Lead.

Lead,	2	3
Tin,	1	

Amalgam of Gold for Gilding on Metal.

Mercury,	91 to 89	100
Gold,	9 to 11	

Amalgam of Silver.

Mercury,	85	100
Silver,	15	

Amalgam for taking impressions of Seals.‡

Copper,
Mercury,

Amalgam for Silvering Mirrors.

Tin,	70	100
Mercury,	30	

Amalgam for Silvering Globes of Glass.

Mercury,	80	100
Bismuth,	20	

Amalgam for the Cushions of Electrical Machines.

Mercury,	2	4
Tin,	1	
Zinc,	1	

Among the twenty-three metals that are not enumerated in the foregoing list, there are several that enter into alloys, but they are without utility in the arts; we should not, however, include in the

plied, being superior to it in hardness and colour, and yet inoxidable under all the usual circumstances.

* An extremely useful alloy, having a degree of elasticity only exceeded by steel, with all the advantages of superior lightness and hardness over platinum; this, and the preceding, are due to Mr. Percival N. Johnson, of London.

† The copper and zinc ought to be taken in the form of brass; for two parts of silver, take one part of brass.

‡ This amalgam is hard, and melts at a low heat; it was used by the French police, under the administration of the celebrated Fouché, for the purpose of opening and resealing the letters that passed through their hands.

remark, the native alloy of Osmiun and Rhodium, which is excessively hard, and is at present used for the nibs of metallic pens.

Care has been taken in the arrangement to name those metals first, which enter in the largest quantities in the alloy.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Observations on the Ailanthus Tree.

The Journal of the Franklin Institute is principally devoted to the arts, and mechanical science, but its plan and object comprehend occurrences in agriculture, and other branches of industry, connected with the wants and resources of our country; and the intimate connexion that exists between increasing the raw material, and the prosperity of the arts and sciences, will, we presume, secure to the following "sylvan" article, the attention of those who are interested in land, as earnestly as those connected with trade.

It is only a few years, since the good sense and patriotism of some commander of a private merchant ship, brought to this country the tree known by the different names of Ailanthus, and tree of heaven. To account for these names is not now our business, and it is from our not knowing the name of the citizen to whom the country is indebted for its introduction, that we are prevented from making honourable mention of him. Our object is to present to the public a few observations on the phenomena connected with the Ailanthus.

In the winter of 1826-27, four of these trees were planted on the same day, and under the same circumstances, with a great variety of other trees; they have, in a surprising degree, outstripped all of them in growth, as will appear by inspecting the table that accompanies this paper.

In the summer of 1832, a branch was sawed from one of these trees, at the distance of six feet above the ground. A piece was cut from the end of this branch nearest to the tree, and has been preserved in a dry place. In seasoning, it has rent in some places; it has lately been split, and planed; it takes a very smooth surface, is hard and heavy, properties that could not be expected in so rapidly growing wood. The appearance of the wood has in it all the promise of its having important good qualities, and that it is destined to be useful in the arts.

We have not yet had experience sufficient to determine the soils and situation most congenial to its growth; but in the places where it has been planted, it has thriven remarkably, and in rapidly making wood, appears to surpass all the other trees, native and imported. It leaves behind it both the weeping willow, and the Lombardy poplar; in beauty, it is superior to the latter, and, at least, equals the former; and it possesses, to an extraordinary extent, the property of propagating itself by its roots.

From the yet limited observations that have been made on this tree, these facts are sufficient to recommend it to the attention of land-owners, and, we think, to induce them to commence its cultiva-

tion, by planting a few acres of it. Independently of its high promise as lumber, it is likely to be good fire-wood, and must, in the shortest period of time, yield more, as charcoal, than pine, oak, &c.

All these circumstances, we hope, will secure for it a fair trial.

The piece of the wood referred to will be left, for inspection, at the Hall of the Franklin Institute.

The following table shows the individual and average circumference of forty-seven trees, of twenty-one different kinds, the most prospering of a large number that were planted in the Philadelphia Cemetery, in January, 1827.

		No. of individual trees meas'd.				Aver. in.
Ailanthus,	Glandulosa,	31¾	34	29	29½	31.06
Weeping Willow,	Salix Babylonica,	33		27½	15	27.37
White Maple,	Acer Daysicarpon,	20½	25½	29½		24.71
Tulip Poplar,	Liriodendron Tulipifera,	14½	19¼	22		22.68
Catalpa,	Catalpa Cordifolia,	21	26	13¾	26½	21.81
White Walnut,	Inglans Cinerea,	8	16	13	11¼	12.06
Honey Locust,	Gleditschia Triacanthus,	20¾	15			17.87
Buttonwood,	Platanus Occidentalis,	16	25	22	30	23.25
White Oak,	Quercus Alba,	13¼	13¼			13.25
Native Mulberry,	Morus Rubra,	8½	8½			8.50
Chesnut Oak,	Quercus Mentana,	8	8			8.00
Red Oak,	Quercus Rubra,	9½	9¼			9.37
White Ash,	Fraxinus Americana,	11	10½	8½		10.00
Spanish Oak,	Quercus Falcata,	9¼	11½			10.37
Balm of Gilead,	Pinus Balsamea,	5½				5.05
Aralia,	Aralia Spinosa,	6½	6			6.25
Hemlock,	Pinus Canadensis,	5				5.00
Gum,	Liquidamba Styriaciflua,	10½				10.05
Deciduous Cypress,	Cupressus Disticha,	11½				11.05
White Pine,	Pinus Strobus,	10¼	11			10.62
Sumach,	Rhus Typhinum,	15				15.00

The trees were procured from Mr. Robert Carr, of Bartram's garden, and planted by the late Mr. Hibbert.

The soil they grow in is the loam common to the site of Philadelphia, and the upland portion of the townships of Moyamensing and Passyunk.

The measurement was taken at the height of six feet above the surface of the ground. J. R.

On the most Eligible Arrangement of Railway Machinery. By William M. Cushman, Civil Engineer.

TO THE COMMITTEE ON PUBLICATIONS.

An erroneous disposition of those parts of railway carriages which involve the principle of the wheel and axle, may cause the loss of so large a per centage of power,* as to determine the success of a road

* By *loss of power*, our correspondent would no doubt have us to understand a *diminution of useful effect*. Com. Pub.

otherwise judiciously constructed; yet present opinions respecting the size of greatest efficiency, conflict very much. This result is perhaps traceable to the propensity to dispose of a matter which may be rigorously calculated, entirely by the judgment, so often egregiously at fault in kindred questions. But it is no part of the design of this paper to enter upon the metaphysics of a Gordian knot; whatever may be the origin of existing diversity of opinion, it is certain that the size which, *cæteris paribus*, permits the ratio of the neat load to the motive force employed in its transport, to stand the highest, is *that alone* which it avails aught to discuss, since it yields the highest useful effect with a given power.

The first consideration having a decided bearing upon the resolution of this question, is, that railways, in common with other machinery, only permit the transport of weights ranging within certain and fixed limits; few roads would long sustain the transit of loads exceeding three or four tons in gross, upon cars having but four wheels, and the lesser load is the conventional limit in reference to which roads are oftener constructed than to any other.

2dly. The obvious reason for employing the wheel and axle is to diminish friction; now, the wheel may be conceived *so small*, that no useful result will come of its employment; again, since the weight and dimensions are necessarily increased as its diameter is enlarged, the limit of strength exacts a synchronal diminution of the load. When, then, the weight of a wheel reaches this limit, it is clear that no useful result can come of the use of the power of the wheel and axle. Between these extremes, then, it is plain, *there is* a size more efficient than any other. To determine this size, let

$\frac{x}{c} = \frac{x}{6600} = \frac{1}{b}$ = quotient of weight of body of car, and its gross weight;

w = weight of wheels;

$\frac{1}{t}$ and $\frac{1}{a}$ = ratios of friction at the periphery and axle, respectively, to gravity;

r, r' be radii, the former of the wheels, the latter of their axles;

m = sine of inclination of grade;

T = absolute force of traction; and

E = ratio of neat load to T;

then, agreeably to what has been advanced, there results—

$$\mathrm{E} = \frac{c - \overline{w + x}}{\mathrm{T}}$$

and from well known principles, $\mathrm{T} = \overline{c - w}\,|\,.\,\frac{r'}{a\,r} + \frac{c\sqrt{\mathrm{R}}}{t\sqrt{r}} \pm m\,c;$

whence—

$$E = \frac{c - \overline{w + x}}{\overline{c - w}\Big|\frac{r'}{a\,r} + \frac{c\sqrt{R}}{t\sqrt{R}} \pm m\,c};$$

but since w does not vary in the simple ratio of r, it becomes necessary so to express it, that at every change of r it may be truly expressed. If the material of the wheels is cast-iron, known principles give $W = \frac{16}{3}\sqrt{r^3} + 24\,r^{*}$ very nearly; whence, on eliminating w from the last expression, by this value, it ultimately takes the form—

$$E = \frac{c - \frac{16}{3}\sqrt{r^3} - 24\,r - x^{\dagger}}{\overline{c - \frac{16}{3}\sqrt{r^3} - 24\,r}\,\Big| \cdot \frac{r'}{a\,r} + \frac{c\sqrt{R}}{t\sqrt{r}} \pm m\,c} \quad (1)$$

This is to be a maximum, and, therefore, the differential to be made equal to zero; whence, on actually differentiating and substituting known values of R, a, and t, the radius of maximum efficiency is expressed by the subsequent equation, viz:

$$\frac{5}{9} + r^{\frac{1}{2}}(1 - m\,bx) - 15\,r^{0}\,m\,bx - r^{-\frac{1}{2}}\,x\left(.09\,b + \frac{r'}{12}\Big|\overline{4b+1}\right)$$
$$- \frac{3\,r^{-1}.r'\,bx}{2} + \frac{33\,r^{-\frac{3}{2}}}{4}\Big|\overline{b-1} + \frac{r^{-2}.r'\,bx^2}{32}\Big|\overline{b-1} = 164 \quad (2)$$

If $2\,r' = 1\frac{1}{3}$ inches; $x = 400$ lbs., and $m = .004$, the numerical valuation of equation (2) gives $r = 21\frac{1}{3}$ inches; that is, the diameter whose efficiency is greater than any other, on a road whose inclination is 21.12 feet to the mile, and adapted to the transit of gross loads of three tons, is $42\frac{2}{3}$ inches.

If this value of r be substituted in equation, (1,) there will result 130.2 for the value of E, when it is a maximum. The substitution of any other value of r, whether greater or less, ought to give E a less value than this.

To compare the performances at other sizes, I have computed them for the several sizes detailed below, and tabulated the results. The expense varying as the effects inversely, the column headed relative

* The number of arms is taken at sixteen, and the weight of car at three, tons in the determination of these numerical coefficients.

† The negative sign does not obtain, because, to compare the neat load with the force actually requisite on the descent, is improper, inasmuch as the power adequate to accomplish the ascent must accompany the descending trade, though it be not actively employed. Thus, the mean effects are virtually the same as the ascending ones, and $+\ m$ becomes, in general, the only value eligible in the solution.

expense will show, by inspection, the per centage of power *lost* by the *departure either way* from the size answering to the maximum effect; this will place the subject in a clearer light with those to whom the necessary employment of the higher calculus has rendered it less intelligible.

Diameter in inches.	Effects.	Relative Expense.
80	114	114
72	119	109½
60.5	125	104
50	127	102½
42⅔	130.2	100 maximum.
40.5	125.8	103½
36	124	105
30	119.2	109
24.5	112	116
18	109	121

Thus, if the size be *enhanced* to 50 inches, a *loss* of 2½ per cent. ensues; if to 60½ inches, 4 per cent., &c. Per contra, if it be *diminished*, at 40½ a *loss* of 3½ per cent. follows; at 36 inches, 5 per cent.; at 30 inches, 9 per cent.; at 24½ inches, 16 per cent., &c.

Agreeably to the nature of maxima, small deviations either way from the value of r, when E is a maximum, ought to produce but slight changes in the result; this is conformable to the table, where a departure of an inch is found to have no very sensible influence upon the effects, while greater deviations show a rapid loss. Economy in construction determines, however, when a slight difference is made, that it be within, rather than without, the size answering to the maximum.

The constants assumed in resolving the equations numerically, being mean values which obtain on most well constructed railways, the deviations from the tabulated results will commonly be insensible. With due deference to the views of others, we therefore think it conclusively shown, *that a wheel of three and a half feet in diameter is better adapted to railways than any other size whatever*, as a general rule; when locality, or the purposes of a road, render the data different, the change in the theorems already given is sufficiently obvious.

Albany, September, 1835.

FRANKLIN INSTITUTE.

Committee on Science and the Arts.

Report on Mr. J. K. Smith's self-acting Brake for Rail-road Cars.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a self-acting Brake for Rail-road Cars, invented by Mr. J. K. Smith, of Pottsville, Schuylkill county, Pennsylvania, REPORT:—

That this invention consists in a rod, or slide, attached to the front

part of the frame of the car, which is pressed in whenever the car comes in contact with the one before it; the motion of this slide brings the brakes into contact with the wheels, by means of a suitable arrangement of levers, or by a chain passing around a pulley. As soon as the contact of the cars ceases, the brake is freed, either by its own weight, or by a spring.

As Mr. Smith claims the principle of acting upon the brakes by the contact of the cars, and has proposed several different modes of effecting this, it is unnecessary to describe any particular arrangement.

The principal advantages of this invention are, that it will relieve the engine from the pressure of the train, when about to be stopped, and will prevent the hinder cars from rushing upon those in front, should their speed be suddenly checked by any casualty, and may thus prevent the lamentable effects with which these accidents are frequently attended. It occurred to some members of the committee, that these brakes might produce an unpleasant jerking when starting or stopping, and when travelling over a curved or an undulating road; but they are informed that several of them have been in use upon the Little Schuylkill Rail-road for some months, and that no such unpleasant effect has been experienced. There is, however, one difficulty attendant upon the use of this contrivance, for which no remedy has been suggested. Whenever it becomes necessary to back the train, all the brakes must be thrown out of gear, and the time consumed in this operation may be of the greatest importance at a critical juncture. Notwithstanding this objection, the committee are of the opinion that the use of this brake will tend to diminish the danger of rail-road travelling, and they would recommend a trial of it to those who are concerned in that mode of transportation, believing that it will be found worthy of their attention, both in a benevolent and profitable point of view.

By order of the committee.

William Hamilton, *Actuary.*

August 15th, 1835.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN MARCH, 1835.

With Remarks and Exemplifications, by the Editor.

1. For an *Oil Bush and Cap Neck* for mill-stones; Jesse Kinman, Clinton, Lycoming county, Pennsylvania, March 2.

The oil bush here alluded to is to be made of cast-iron, and to be let into the stone. A rim rises round its outer edge, and also around the hole in its centre, to enable it to contain oil; four blocks of hard wood, or of some suitable metal, are made to slide between cheeks, to embrace the spindle, against which they are made to bear, regularly, by means of wedges. The cap, to keep out the dust, is particularly described, but as there is no claim made to this, or any

other part, we shall not dwell upon it; we are told that a part of the apparatus, "the metal collar, and the harness collar, is not considered as part of the improvement," and, of course, every thing else that is described is considered as new, even the hard wood, or metal, blocks which are to embrace the spindle.

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2. For an improvement in the machine for *Packing Flour* in barrels; John Kinman, Hartley, Union county, Pennsylvania, March 2.

A shaft is to be made to revolve vertically, which shaft has at its lower end four round spindles, projecting out from it at right angles, and, consequently, forming a horizontal cross; upon these four spindles are to be placed four conical rollers, which are to revolve freely on them; each roller is to be five and a half inches in length, three inches in diameter at its inner, and eight at its outer, end. The end of the shaft is to pass into the barrel, and the flour to be conducted into it by means of a trough, or spout, connected with the meal chest. Instead of making the shaft to revolve, it is said that the barrel itself may be carried round by suitable machinery; in either case, a vertical motion must be given to the shaft as the quantity of flour increases in the barrel.

We do not think the machinery represented in the drawing, and described in the specification, is the best that might be devised for the purpose; the claim, however, is not to this particular arrangement, but to "the machine for packing flour, as described, unconnected with the machinery for putting it in motion, as that will have to vary according to the situation of the machinery of the mills in which it is placed." By the machine, we presume, from the context, that we are to understand, the packing by means of the revolving rollers.

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3. For a *Plough;* Joseph Tinkler, Warwick, Tuscarawas county, Ohio, March 2.

This machine is rather complex, as it is to consist of two perfect ploughs, united together,and attached to the same beam; these ploughs are to be brought alternately into use, and, to effect this, the beam must be shifted at the end of the furrow, in a manner described in the specification.

"The plough is designed for both a hill side and flat land plough. It may be used as a common, or double, plough. The method of turning or changing it from point to point, is simply, at the end, instead of going round a piece of ground in the usual way, raise the pin, and when it is up, turn your team, and when the beam has moved a little way from its place, you may let go the lever, and when it is sufficiently round, the pin will drop into a hole in the opposite side of the neck. In turning, the point that was in the ground rises, and the other falls, when you may return by the same furrow which you came."

"That part of the plough which I claim as my invention, is the combination of two perfect common ploughs in one, with the point of

one elevated, whilst the other is in the ground; the revolving neck, and the principle of moving the handles from side to side, at pleasure."

We have not attempted to give a particular description of the arrangements by which the object in view is to be attained, as this could scarcely be done without a plate. Double ploughs, with shifting beams, have been patented, but the manner of attaching them, and the auxiliary arrangements, as presented to us in the specification before us, differ materially from any which have been heretofore adopted.

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4. For a *Stone Eradicator;* John C. Blauvelt, Newtown, Fairfield county, Connecticut, March 2.

This instrument is, essentially, the common hook and lever, used for rolling logs at saw-mills, for removing stones, and for various other purposes; the patentee claims to have improved it by the particular curvature which he gives to it's two essential parts, the manner of arranging the toes, or claws, and the application of the power of animals, by attaching them, when necessary, to a link, or clevis, at the end of the lever. He says, "I do not claim to be the inventor of a hook and lever to raise stones out of their beds in the earth, but what I do claim as new, is the manner in which I have arranged and combined the hook and lever, and the manner of applying animal power thereto." The improvements alluded to do not appear to be of a very substantive kind.

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5. For a *Lever and Dead Weight Propelling Machine;* Luke M. Edwards, Gibson county, Tennessee, March 2.

There is some ingenuity in the contrivance of this affair, but, unfortunately, the whole praise due to it ends there, as a worse arrangement for the application of animal power to drive machinery could not well be devised by the most inverted intellect. A lever, or sweep, is to be drawn round by a horse in the ordinary way, and is to turn a shaft which carries a spur wheel, the teeth of which take into a lantern, or wallower. The sweep and horse walk are above the large spur wheel, and work upon a pin descending from the top of the building, being altogether detached from the shaft of the main wheel. This shaft has a gudgeon at its lower end working in a step; the shaft itself, however, does not stand vertically, but is inclined from the perpendicular two and a quarter inches to the foot, and the main spur wheel, which is to stand horizontally, is attached to the shaft at the same inclination, and with a corresponding eccentricity. The upper gudgeon of the shaft is made very long, and, instead of running in a box, bears against the side of a circular hole, or opening, in the centre of the floor upon which the horse is to walk, which hole is of such size as will admit of the spur wheel standing horizontally. The lever, or sweep, bears against the gudgeon, or prolonged shaft, and pushes it round. The axis travels, therefore, not like that of the earth in its annual orbit, but, although somewhat faster, like the

same axis in causing the precession of the equinoxes, and, by this intricate and queer contrivance, the spur wheel preserves its horizontality, and its periphery revolves in a circle. A "dead weight is to be placed on the rim of the spur wheel," which is to operate we know not how, unless it be to keep the upper gudgeon in contact with the periphery of the hole above named.

The patentee has some notion of a gain of power from this arrangement, but we are unable to perceive in what way he has reasoned to deceive himself, although it is manifest that he has effectually done so. The following is his claim.

"I claim the application of the lever to the top end of the shaft, and the top end of the shaft moving round in the circle with an inclination of two and a fourth inches to the foot; and the application of dead weight, instead of *lein*, [?] on the virge of the wheel."

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6. For a mode of *Sustaining the Weight, and Applying the Power, in Wheeled Carriages;* Samuel Chapman, Windsor, Berkshire county, Massachusetts, March 2.

(See specification.)

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7. For an improvement in the mode of *Casting Chilled Rollers, and other Metallic Cylinders and Cones;* James Harley, Pittsburg, Allegheny county, Pennsylvania, March 2.

(See specification.)

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8. For a *Cook Stove;* Joel Rathbone, city of Albany, New York, March 6.

After stating that inconveniences have been experienced from the construction of the ordinary Jews'-harp, or flat cook stove, from the waste of heat, the burning out of the front oven plate, and the unequal distribution of heat through the oven, the patentee describes the improvements by which he proposes to obviate these inconveniences; they are, "First. In recessing, by a curve line, or sweep, so much of the front furnace plate as lies below the kettles, in such manner as to bring the face thereof more or less under the bottom of the kettles; and secondly, in opening on the back side between the furnace and the oven, and between the flue that passes over and the flue that passes under the oven, a horizontal passage for the air to circulate through."

The claims made are to the foregoing improvements, which are very distinctly represented in the drawings that are deposited in the Patent Office.

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9. For an improvement in *Cutting the top part of a Horse Hame Collar;* Timothy Deming, East Hartford, Connecticut, March 6.

"The top, or casing part, of the collar is to be cut in four pieces, to be united at the centre, or bottom, and upon each side, nearly or directly under where the hame tug draws across the collars. The

place of uniting on the side to be sufficiently covered, to protect the same."

The foregoing is the whole description, and the claim is to the manner of cutting, as described.

10. For an improvement in the construction of *Trip Hammers;* Heman Redfield, Grafton, Worcester county, Massachusetts, March 6.

This is a very trifling affair, consisting of a wheel, like a lathe wheel, turned by a treadle, a band from which gives motion to a whirl above, which has pins upon it that raise the handle of a hammer; a spring is used to bring the hammer down upon the anvil with a smart blow; the *inventor*, who, it appears, is a cordwainer, says that he has "employed it in hammering the soles of boots and shoes, and has ascertained that it operates with perfect success." As this hammer is tripped, it may certainly be called a trip hammer, although the name conveys the idea of a very different thing. The claim is to "the application of the spring to the arm, or beam, holding the hammer, by which the blow is increased."

11. For a *Winnowing Machine;* Truman B. Brown, Locke, Cayuga county, New York, March 6.

What are called improvements in this apparatus, appear to us of so trifling a character, as not to demand the time and space which would be required to make them known.

12. For an improvement in the machine for *Seaming the bottoms of Tin Plate;* James Redheffer, Bridgetown, Cumberland county, New Jersey, March 6.

A frame is made in which revolve two shafts, or spindles, geared together by cog wheels, and turned by a winch; these spindles carry two disks, or rollers, of steel, four inches in diameter, the lowermost of which has a plane cylindrical surface, and the upper a projecting flanch to turn the seam. The tin vessel, after passing through the paring machine, is then double seamed by means of that above described. The claim is to the method of double seaming by means of the rollers.

It is many years since we examined the revolving rollers and other machinery used in the manufacturing of vessels from tin plate, and we cannot aver that among them there were any disks for seaming precisely similar to the foregoing, although we are strongly impressed with the idea that such was the fact.

13. For an improvement in the mode of *Catching Fish;* Charles Fowler, and Edwin R. Hanks, Hartford, Hartford county, Connecticut, March 6.

A *steam engine* is to be erected on the shore for the purpose of paying out the seine, and drawing the boats to the shore. Two

blocks are to be fixed out in the stream at such distance apart as shall be equal to the length of the seine, and at the centre point between these blocks, two others; corresponding blocks are to be placed on the beach, so that two endless bands, or ropes, may be drawn around them, forming, when in use, two quadrangles. The ropes on shore are to be drawn by the steam engine. Two batteaux, each containing one-half of the seine, are to be drawn from the shore to the centre blocks, where they are to be cast off, and again made fast outside of the blocks; by drawing upon the ropes, the seine is then made to pay out each way to the outer blocks.

"What we claim as our invention, is the drawing the said boats from the shore around their proper circuits for paying out the seine, and then to the shore, by means of steam power, in the room of rowing; and likewise said drawing in of said seine by said engine."

We think the foregoing form of claim exceptionable, as it merely refers to the use of steam for drawing a rope, or ropes, which certainly is not the invention of the patentees; the proper subject of the patent, we apprehend, is the arrangement of the ropes to enable them to effect the purpose intended, whether steam or animal power be employed.

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14. For *Manufacturing Brushes for Blending Colours;* George W. Morris, city of Philadelphia, March 6.

The patentee simply informs us that the hair which he has discovered for making blending brushes is taken from oxen, cows, or horses, that of a white colour being preferred; that he obtains it from those who prepare hair for the upholsterers, taking that which is of the stiffest kind; that it requires combing, and is prepared in the ordinary way of preparing hair for brushes, by bleaching.

Should a man take a shaving brush, such as is made from the kind of hair used by the patentee, and employ it as a blending brush, would he thereby subject himself to damages?

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15. For an improvement in the *Use of the Saw;* Anson Field, Jericho, Chittenden county, Vermont, March 6.

By the improved use of the saw, the patentee means an improved mode of fixing the saw for use, the purpose to which he proposes to apply it being, principally, the cutting of wood for the fire, in doing which he proposes to cut through a log at a single stroke, provided the saw be *long enough.*

Cheeks of wood, or iron, are to be fixed on each side of a saw, embracing it between them in such a manner that at one end the teeth shall rise but little above them, whilst at the other the blade is to project sufficiently to pass through a log. This is then to be placed between slides, so as to allow it to slide back and forth like the frame of a mill saw, "as may be most convenient," and "where thought best," "the timber to be cut confined to it as may be most convenient;" the saw to be moved "by means of any machinery thought best to attach it to." "By this process, a stick of timber of

any size may be taken off by one sweep of the saw, provided it be of sufficient length, and width at the back end. The saw may be graduated so as to cut from half an inch to two inches to the foot, according to the size and nature of the timber to be cut." "What I claim is the manner of confining it between the two slips; the way in which it slides, and the principle on which it cuts, viz: being so confined as to cut, at one sweep, the entire width of the saw above the slips."

We have thus placed before the reader the whole sum and substance of the *invention*, and it will be perceived that those persons who wish to carry it into operation, are left at ample liberty to devise the means of doing so. It is probable that a twenty horse power steam engine may suffice to work the saw, and cut through a nine inch log at a single sweep, a powerful screw press, or some analogous instrument, being employed to hold the log.

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16. For a *Thrashing Machine;* Thomas D. Burrall, Geneva, Ontario county, New York, March 6.

By an advertisement attached to the drawing of this machine in the Patent Office, dated January, 1834, it appears that more than three hundred of these machines were then in use, and in the lapse of a year it is probable that the number has been considerably increased. The law is, that if an inventor allows his machine to go into public use, or to be publicly sold for use, he has thereby abandoned all claim to an exclusive right. The thing patented must be *new* to the public. It must be confessed, however, that if the machine before us had been patented at the date above named, or even some years previous thereto, there would not have been any thing new in it, as may be inferred from the subjoined claim.

"What I claim as my improvement, is the cylinder armed with spikes, or teeth, or other similar projections from its surface, passing or mashing through corresponding teeth, or projections, in the concave; with racks, or skreens, in the concave for separating the grain from the straw."

The drawing, so called, requires a label to tell to what species it belongs; it is without written references.

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17. For an improvement in the *Mariners' Compass;* Jonathan Ball, Buffaloe, Erie county, New York, March 6.

The patentee concludes his specification with the following claims: "Rendering the card on both sides equally visible, as well from above as below, by means of the hemisphere of glass." This glass hemisphere is to take the place of the brass hemisphere, within which the compass card ordinarily plays. There is to be an opening through the deck, under the binnacle, that the steersman may see the card by the light in the cabin, whilst it is visible in that apartment also.

In the second volume of the new series of this journal, p. 129, there is the specification of an improvement in the mariners' compass, combining all the essential features of that now patented, with the

addition of perfect security to the instrument against injury by cannon shot, from its being contained within the thickness of the deck. The patentee in that specification says, "The compass box is made with a glass bottom, so that the card can be seen as perfectly in the cabin as upon deck; I also make the compass card translucent, in consequence of which it may be lighted from below; the compass is defended at top by a very thick piece of glass; the lower side of the box is also glazed, and I contemplate sometimes the making the sides of the box, of glass." The foregoing quotation from the patent of 1798 will show, clearly, the identity of the two contrivances; and, if report be true, the same thing had been in use on board of some British national vessels previously to the above date.

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18. For an improvement in the *Fishing Boat;* John Donn, city of Washington, D. C., March 6.

The advantage proposed to be obtained by the improvement in the fishing boat here patented, is, principally, an increased length of leverage for the oarsman. This is accomplished by extending wings on each side of the boat, from stem to stern these wings being carried out horizontally by means of knees, thus widening the upper part of the boat, whilst that portion of it which is in the water remains as usual. The oarlocks are, of course, placed on the outer edges of these wings, which have the ordinary finish of gunwales. Some incidental advantages from this arrangement are mentioned, such as securing the boat from the effects of the swell, and thereby lessening the risk of foundering; the increase of room, also, for the seine, which, as usually placed altogether in the stern, raises the bow out of the water. The claim is to the wing constructed as above described, and applied to a fishing boat.

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19. For a *Stove;* George J. Payne, Erie, Erie county, Pennsylvania, March 6.

This stove is to be made in the general form of the open Franklin stove, but to be adapted to cooking; for this purpose, the back is to be curved backwards at its upper end to increase the room, and an oven is to be formed, with doors opening in the front plate. The flue continues over the oven, under the top plate, where there is an opening for a pipe. Pans, or kettles, have also their appropriate openings. The whole is described in a very general way, nothing being said respecting the particular improvements made by the patentee, or in the way of claim.

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20. For a *Sausage Cutting Machine;* Peter Fahnestock, and John Monn, Jr., Quincy, Franklin county, Pennsylvania, March 11.

The meat in this machine is to be cut between two vertical disks, one of which is turned by a winch, whilst the other is stationary. One of these disks is made concave to admit the meat from a hopper, and they are both furnished with knives so placed as to pass each

other; towards the periphery the knives are more numerous than near the centre, the meat being fed through an opening near the axis, and delivered through another at the periphery. The claim is to the application of knives to a face wheel, and to the other parts which are necessary in the particular arrangement of such a machine. This differs from the sausage machines previously patented, which, we think, is its only peculiar merit.

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21. For an improvement on the Napier *Printing Press;* Michael Caton, and John C. Rives, city of Washington, D. C., March 11.

The improvement to which the foregoing title refers, is intended to make a more perfect register than has hitherto been done on the cylinder press.

It would require too much space to give a full description of the improvement referred to ,for, although it is in itself simple, it is connected with a machine of much complexity, and not generally understood. Two points are to be placed above the cylinder, and so near to it that a sheet will not pass between them and the cylinder when being put on, and in such places that the foremost corners of the sheet will rest against them. These points are to be geared to the shaft of the registering apparatus now in use, [Newton's,] so that it will raise them just at the moment the fingers of the press take hold of the sheet, and keep them raised until the sheet passes from under them, when they must instantly drop to their first position. By putting every sheet against these points, they will, if of the same size, have all their margins equal.

Two screws, each having on their heads the letter o, about the size of a long primer o, are to be screwed into one of the cross-bars of the chase, and these must be so regulated that the heads are exactly even with the type locked up in it, and at such place that they will make an impression upon the printed sheet about an inch from each edge of it. The impression made on each sheet in working off the first side, may be distinctly seen when the paper is turned to work off the second side.

On the inclined board on which the sheets are laid, to be taken off by the fingers of the press, two movable points are to be placed at the same distance apart with the screws in the chase, and the centre of the o made by the first working is to be placed exactly over these points, adjusting them so as to make register. A boy will be required on each side to lay on the sheets correctly, which habit will soon render easy.

Other modes, it is observed, of producing a like effect may be resorted to; types, for example, might be locked up in the chase, near to the cross-bars, as substitutes for the screws; but what is relied on, is not the precise mode described by the patentees, but the making register by producing a mark upon the sheet, with any thing connected with the chase.

22. For an improvement in *Grates for Burning Anthracite, &c.;* Barnabus Pike, city of New York, March 11.

This whole invention consists of a flat grate, which is to be used for fireplaces of all kinds, whether open or closed; the grate is made to slide upon bars, and has a handle to it by which it may be moved by a sifting motion, or drawn out sufficiently far to discharge the contents of the fireplace. The claim made is to "the horizontal grate and floor, as aforesaid, when employed in the use and management of heat, in whatever manner the same may be constructed and adjusted, whether used in stoves, fireplaces, or furnaces."

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23. For an improvement in the construction of *Tailors' Shears;* John Andrews, assignee of Rockus Heinisch, city of New York, March 11.

The upper side of the lower bow, or ring, of the shears is to be made flat, or widened out, so that the fingers which press upon it in the act of cutting, may exert their power without the inconvenience experienced in the uses of shears as ordinarily made. The claim is simply to the widening out this part, as described.

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24. For an improvement in the construction of *Water Wheels;* Robert Eastman, Concord, Merrimack county, New Hampshire, March 11.

The patentee calls this a "combined percussion and reacting wheel." There is a stationary cylinder which stands vertically, and within this is a second cylinder, less than the former, and fixed on gudgeons to revolve within it. On the lower end of this second cylinder is the reacting wheel, made in the form of Wing's and other reacting wheels; it has its upper edge even with the ordinary surface of the water in the river, or tail race, and fitting closely against the lower edge of the stationary cylinder. Above this reaction wheel there are floats on the revolving cylinder, extending upwards, and upon these the water is to strike on being admitted through a conductor, or trunk, opening through the stationary cylinder for that purpose. The water, it is said, will rise nearly to the height of the head in the space between the two cylinders, and thus act by its gravity upon the reaction wheel, with little or no loss of effect upon the percussion floats. The claim is to the before described arrangement.

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25. For an improvement in the *Water Closet;* James Stone, city of New York, March 11.

This improvement consists of a pendulous weight attached to a rod, and connected by joints to the pan of the water closet. The specification refers throughout to a drawing, which exhibits the plan very perfectly. The contrivance is very simple, and appears to be extremely well adapted to its purpose, without a liability to get out of order.

26. For an improvement in the manner of ***Fastening Hames on Horse Collars;*** Timothy Taylor, Jr., Purcel's store, Loudon county, Virginia, March 11.

The strap by which the hames are to be drawn together at the lower end, so as to tighten them on the collar, passes through a loop formed on a strip of iron which extends along one hame, and the other end of the strap hooks into a notch on an iron lever that lies against the other hame, and hooks to the other end of the strap. This lever turns on a pin near its lower end, and in so doing loosens the strap and the hames; and when returned against the hame to which it is attached, it draws and braces the strap at the lower end; the strap is furnished with a buckle by which it can be lengthened or shortened. The claim is to the foregoing apparatus.

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27. For a *Mortar Mixer and Mason Tender;* Samuel Whitman, Vermillion county, Illinois, March 11.

A carriage, having a resemblance to a wagon body, is to be placed upon wheels in order to move it from place to place; it may be about fourteen feet long, and six wide. Attached to it there is an inclined movable floor, upon which a horse, or other animal, may walk in order to give motion to the machinery, which consists of boxes, wherein the lime and sand are placed and sifted; a rake, moved by a crank, for mixing the mortar; pulleys and tackle for raising hods to the top of the building, and certain other appendages which may be required. The claim made is to "the manner of putting together the several parts as above described, on the principle laid down; or, in other words, the combination and arrangement of the parts."

Such a description and claim as form this specification, if they secure any thing, cannot embrace more than the particular arrangement adopted by the patentee, as there is not any thing new in the individual parts, and as analogous combinations have been repeatedly made.

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28. For a *Churn;* Benjamin Randal, North Pownal, Cumberland county, Maine, March 11.

To get up a really new churn would be no easy task, and we are not disappointed, therefore, in finding the one before us much like others which have previously passed in review. Double churns are common, but the present patentee makes the body of his an oblong square box, with two dashers, one near each end. The dasher handles are attached to a vibrating lever, supported on two standards, the vibratory motion being given by the turning of a crank shaft. A very particular description is given of all the parts; such, for example, as that the dashers are formed by two pieces of wood crossing at right angles, and halved into each other. The claims made serve to show the difficulty of pointing out any thing that is new, consisting of "the application of the standards to receive the bar which revolves between them, and in the formation of their lower ends, together with the cross wedges by which the top may be removed from the box, when these wedges are loosened."

29. For a *Horse Power;* William E. Arnolds, Chatham, Middlesex county, Connecticut, March 13.

This we believe to be a new mode of applying horse power to drive machinery; it is contrived with considerable ingenuity, but this, unfortunately, is no guarantee for its practical utility. The horse is to stand upon a platform made of slats, which, instead of being placed crosswise, as they are in the endless bands, extend longitudinally upon the basis of the machine; these slats are to stand edgewise, and are to be so thin, that the foot of the horse will cover the edges of three, four, or more of them; the slats constitute parts of two sliding frames, every other one being secured to its corresponding frame. These frames rest upon a kind of cam rollers, which, with the addition of certain cam, or eccentric, wheels, cause the frames alternately to rise against the feet of the horse, and to traverse backwards and forwards. The particular arrangement by which this is to be effected we shall not attempt to describe. The claim made is to the arrangement by which this new principle of constructing a horse power, is carried into operation.

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30. For a *Steam Wheel;* William Wilson, Henderson county, Tennessee, March 13.

This contrivance is beneath animadversion; the object, we are told, is to throw steam on a wheel without the intervention of "a injain." A wheel, like a tub wheel, is to be placed in a tube of wood, or iron, proceeding immediately from the boiler, a shaft from which, to drive machinery, may extend out to any required length. Grist mills, steamboats, and saw mills, are given as examples of the purposes to which the power of this improved steam wheel may be applied.

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31. For a machine for *Hulling Clover, Thrashing, and Shelling Corn;* Jesse S. Dick, Genesee county, New York, March 13.

It is scarcely to be supposed that the self-same machine will answer all the purposes to which it is intended to apply the foregoing, nor is this proposed, as certain operating parts are to be removed, and others substituted, accordingly as it is wanted for one or the other purpose. We have, on similar occasions, expressed a doubt of the correctness and safety of this procedure. The frame work does not constitute the machine, and if the essential working parts are to be changed, we think the inference that a new machine is thereby created, is inevitable.

For thrashing, there is a concave and cylinder, much of the usual construction, but some peculiarity in the formation of the teeth is claimed as new. A revolving fan is employed in each case, to drive off the chaff. The claims are to "the peculiar form of the teeth in the cylinder, with serrated or boarded edges. The revolving bars or shafts of the sieves, armed with long teeth, and furnished with springs. The arrangement of the parts so adapted to each other as

to allow of their being changed to use the machine for the purposes herein specified, not intending to claim the concave, cylinder, feeding apron, &c., separately."

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32. For an improvement on *Boats for Navigating Canals, Rivers, &c.;* Anthony Plantou, city of Philadelphia, March 18.

Mr. Plantou obtained a patent for constructing and propelling boats, &c., on the 23d of April, 1834, an account of which is given at p. 334, vol. xiv., to which we refer. The object of the present patent appears to be the giving greater buoyancy to the boat than could be obtained by means of the hollow propelling cylinder which he formerly proposed to employ. He still uses cylinders of a similar kind, crossing the boat from side to side, but under these he has a hollow water-tight bottom, as long and as wide as the boat, and of a foot or two in depth; between this hollow trunk, or false bottom, and that bottom on which the loading rests, the propelling cylinders are to operate. It is proposed sometimes to make the secondary bottom perfectly solid, its buoyancy then depending on its specific gravity.

The patentee says, "I claim as my improvement the immersed bottom, solid and made of strong timbers, or made hollow and water tight. And I claim the manner of confining the water between my supporters for canal navigation, so that the boat forms a kind of canal by itself."

Such a bottom would certainly give buoyancy to a boat, but there its advantages would end, although its disadvantages would be various; among them would be its abstracting from the depth of the water in which the wheels are to operate, so as in canals, and other shallow waters, to destroy their efficiency; it would, moreover, carry a good portion of its own load of water in its "kind of canal by itself," and in this way go far to reduce the effective action of the propellers from what it would be if they actually operated upon the water in the hold of a vessel.

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33. For an improvement in the mode of *Connecting Carriage Springs;* Amos Davis, Easton, Talbot county, Maryland, March 18.

The part improved is the movable joint by which the ends of the springs of carriages are attached to the brace, or elsewhere. The joint is to be so made as to appear and operate like a but hinge joint. This construction is said to prevent "the great annoyance produced by the constant clatter and rattling of those heretofore in use," and to allow the joint to be oiled with great ease.

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34. For a *Grist Mill with Small Stones;* Frederick Smith, Evans, Erie county, New York, March 18.

The improvement is said to consist in a "simple and easy method of applying pressure to the upper stone, or runner, and in regulating the stones while grinding." The machine is described by reference

to a drawing, in which it is very well represented. The claim is to "the power given by the lever and weight, through the medium of the slide, and bridgetree, to increase or diminish the pressure upon the runner; and also the power given by the same lever and weight to regulate the stones while grinding."

We were so heartily tired, some four or five years ago, with the numerous plans for applying pressure to the runner in such mills, as to be altogether averse to instituting further inquiries into the difference "twixt tweedle-dum and tweedle-dee." If these small stones, when driven with high velocities, do as good work, and as much of it, as those interested in the use of them have averred, we feel well assured that some of the plans formerly patented for weighting and regulating the stones, left little to desire in perfecting the mill. We doubt, however, from what we have learnt upon the subject, whether the best of them deserves greater praise than that of being a good make-shift.

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35. For a *Garlic and Smut Machine;* Thomas L. Sands, and Benjamin Hendig, Waynesborough, Franklin county, Pennsylvania, March 18.

The essential operating parts of this machine are three cylinders, named respectively the elastic roller, the picking cylinder, and the brush cylinder, each of which revolves horizontally. The elastic roller may be made of wood, and have its surface covered with one or more thicknesses of cloth, or leather, or both. The picking cylinder is also made of wood, and is covered with one thickness of leather; into this, so as to hold firmly in the wood, are driven numerous pointed wires, of about No. 30 or 32; they should be within about one-twentieth of an inch of each other, and project out about the same distance. These cylinders are on the same plane, and are geared together so as to turn towards each other, and the grain is fed between them by a suitable hopper. The brush cylinder revolves behind the picking cylinder, its gudgeons being elevated above the plane of the other two. The wheat which passes through between the two first cylinders is carried by an inclined board towards the front of the machine, and the garlic which is brushed off from the picking cylinder, descends another inclined board towards the back of the machine. The wheat, after passing through this first set of cylinders, may, it is said, be again subjected to the action of a similar set.

"Now, what we claim as new, and our invention, is the combination and use of the within described cylinders, operating in the manner, and for the purposes, herein set forth, varying the same in any way that we may think proper, provided the principle of operation remains the same; also, the using of more than one brush cylinder to each picking cylinder."

36. For a *Metallic Oxide, or Composition, to be used as White Paint;* Forrest Shepherd, Fredericksburg, Spottsylvania county, Virginia, March 18.

We are informed that "The metallic oxide of barium, commonly known in mineralogy as the sulphate of baryta, or barytes, is finely pulverized and mixed with oil, and as such is used as a paint, either without, or mixed with, white lead. What I claim as my invention in the above composition, is the reducing, mixing, and using the said composition, either as a substitute for white lead, or as an improved white paint, being mixed with white lead."

Were the foregoing application of sulphate of barytes new, it would undoubtedly be a proper subject for a patent, but as it has been repeatedly and extensively used for the purpose designated, and in the same way, the parchment will not protect it. The artificial sulphate of barytes is used in the finer kinds of painting, and is prepared and kept in the shops for that purpose, being the most delicate and permanent white known, remaining unchanged by those agents which injure, or destroy, the effect of the preparations of lead.

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37. For *Pannels for Carriages;* Ebenezer Lester, city of Boston, March 18.

(See specification.)

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38. For an *Ointment for the Cure of many External Diseases;* William Allen Gray, city of Richmond, Henrico county, Virginia, March 18.

"White swellings, ulcers of long standing, tumours, eruptions, burns and scalds, old and fresh wounds, callous and glandular swellings, &c. &c.," are among the affections which this ointment is to remove. The following is the recipe for preparing it.

"One gallon cotton seed oil; one gallon linseed oil; one quart sweet oil; one quart Canada balsam, or oil of fir; two pounds of mutton suet; one pound bees-wax; and five pounds sugar of lead."

We shall not add the directions for incorporating the ingredients composing this ointment, although they are given at large in the specification, nor shall we attempt an epitome of its virtues; the patentee stakes his *reputation* on its success in the cure of the bites of spiders, serpents, and mad dogs. Notwithstanding this weighty pledge, we are very apprehensive that the patentee would feel that he had something more at stake, maugre his ointment, were he bitten by a rattlesnake, or a mad dog. The virtues of this composition are dependent upon the sugar of lead, and those who require its use may obtain sugar of lead ointment ready prepared at the apothecaries'. It is useful in burns and ulcers, but for most of the purposes mentioned in the foregoing list it would be worse than worthless, as a dependence upon it would prevent the adoption of the proper remedies. The mixture of cotton seed oil, &c. &c. &c., to form the body of the ointment, is sheer quackery, as sweet oil, bees-wax, and turpentine, properly combined with the sugar of lead, would produce an article

which it would puzzle the patentee to distinguish from his own composition, and which would possess all its virtues.

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39. For a *Machine for Making Wrought Nails;* Samuel G. Reynolds, Providence, Rhode Island, March 18.

From the nature of this machine, it would be useless to attempt to furnish an intelligible description of it without a drawing; the following is the claim made, which will give a general idea of the improvements depended upon to sustain the patent.

"Although there are many parts of this machine which are well known, there is still a characteristic difference between it and other machines for making wrought nails, resulting from the general combination and arrangement of its parts, as will be apparent to every competent machinist; I therefore claim as my invention, the general arrangement and combination of the respective parts of this machine, as described; and among the individual parts I claim, particularly, the employment of perfectly round, or cylindrical, rolls, marked Z Z in the drawing, employed for giving a proper slope to the shanks of the nails; these rolls being brought up against them by means of progressive levers, as herein described, or in any other way by which they are made to produce a similar effect, and operate as substitutes for such rolls, or eccentrics, as have been used in other nail machines, in which the form of the shank is given by depressions cut into the faces of such rolls. The contrivances by which such a progressive motion may be given to the cylindrical rolls are numerous; I have not, therefore, thought it necessary to attempt to detail them, but have described that which I esteem the best, and which I have employed in my machine."

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40. For a mode of *Furrowing or Dressing the disk-like faces of Metallic Mills;* Samuel G. Reynolds, Providence, Rhode Island, March 18.

(See specification.)

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41. For a *Thrashing Machine;* David G. M'Coy, Dublin, Harford county, Maryland, March 20.

There is to be a feeding apron to carry the grain to the cylinder, which cylinder is to be fluted from end to end, the flutes being in the form of saw teeth; besides these flutes, short teeth, or points, are to be driven into the cylinder, which are to project a little beyond the edge of the flutes. The concave is to be fluted from end to end with saw tooth flutes, but as the thrashing is to be effected by a rubbing process, the teeth of the cylinder descend in the manner of a cutting saw, but meet those on the concave in a reversed direction, what may be called the cutting edges of the flutes standing from the cylinder's motion. Across the feeding apron, just where the grain enters under the cylinder, a strip, or beater, is to work up and down after the manner of the comb in a carding machine, in order to force down the

straw, and prevent any tendency to its accumulating. This strip is worked up and down by the action of a toothed wheel.

"What I claim as my invention is not the form of the teeth, or flutes, on the cylinder, nor of those in the concave, when used of a similar shape, but their reversed position as described. I also claim the application of the comb, or strip, rising up and down to perform the operation and intent already set forth."

As regards the-saw like form of the teeth on the cylinder, this was the subject of a special claim in a machine recently patented, and if that claim was then good, it cannot be eluded by the form now given to the contrivance.

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42. For a *Press for Hay, Cotton, Hops,&c.;* Samuel F. Baker, Graham, Cumberland county, Maine, March 20.

The patentee of this machine apprehends that he has doubled the power which he applies, by the reaction, as he terms it, of two followers one upon the other. The articles to be pressed are enclosed within a suitable box, and by turning a power wheel, furnished with pins, or rounds, for that purpose, shafts which cross the press are made to wind or unwind ropes, so as to move the followers, there being a gearing of wheels and pinions for that purpose, which is fully represented in the drawing. The patentee says that "A machine constructed with this two-fold power, or the reaction of one follower upon the other, arising from the operation of one upon the other with ropes, cogs, or chains, can be made one of the most powerful engines of compression, without injury to the machinery."

"What I claim as my own invention, is the application of the two horizontal shafts in the manner described, the reaction they produce in forcing the followers up and down, and the operation of the machine with regard to the double applied power, or with the action of one shaft forcing the followers up and down at the same time."

If the patentee has not yet discovered his error, it is because he has not built and fairly tried an operating machine.

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43. For an improvement in the *Power Loom;* David Whitman, Willimantic, Windham county, Connecticut, March 20.

"The improvement consists of a roller one and a half inches in diameter, with bearings at each end, running in boxes fastened to the breast beam, or front girth of the loom, and revolving by the motion of the cloth which passes over it; the object of which is to lessen the friction of the cloth as it passes from the reed in the lathe to the cloth beam, and to give the cloth an easy vibrating motion; also to have the cloth clear the breast beam, that it may at each stroke of the lathe move easily each way."

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44. For *Wheels for Rail-road Cars;* John Baker, Lancaster, Lancaster county, Pennsylvania, March 20.

The body of this wheel is to be made of wedge formed pieces of wood, extending from the hub to the rim, or tire, the grain of the

wood being in that direction. What are called hub plates are used to embrace the wood on each side, around the hub, bolts passing through from one to the other. The rim also is bolted to these plates, they having a flanch cast on them for that purpose; these bolts cross from the outer edge of the rim to the inner hub plate, and from the inner edge to the outer hub plate, × fashion.

"The axle is let its full size into the hub for one-half the distance, when it may be shouldered off, or reduced, as may be desired." There is no claim made, and what it is intended to patent must be inferred from the foregoing description.

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45. For a *Cooking Stove*, denominated the Franklin Cooking Stove; Isaac M'Nary, Stafford, Tolland county, Connecticut, March 24.

This stove is made in the general form of the open Franklin stove. A boiler fits in on the top plate, and an oven is formed behind the stove, much in the manner of some others; these parts are not claimed as new, the following constituting the invention. A grate which is to contain the fire stands ordinarily upon the bottom plate of the stove, but this may be raised by a shaft which extends across the upper part of the stove, from side to side, above the grate, and is furnished with a winch; from this shaft a chain connects with the grate on each side, and it may, therefore, be elevated, with the contained fuel, and the heat be increased or diminished at pleasure. The claim is to "the lowering and raising of the grate and hearth by means of the above mentioned wheel shaft and chain."

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46. For a *Washing Machine;* Stephen A. M'George, Alexander, Genesee county, New York, March 24.

This is a formidable washing machine, as will appear by the following claim.

"What I claim as my invention, and not previously in use, in the above machine, is the connection of a partition in the centre of the box, or tub, thereby forming two apartments in the tub of said machine, where washing may be done in one, and rinsing in the other, at the same time. Also the application of six pounders, more or less, with upright standards made of metal, with cogs thereon; also cog wheels connected therewith, and the top or cap of the box being connected by a strap or cord with the top piece horizontally placed on the top of the post, with a pulley and crank attached thereto, and centrally placed upon the post of said machine for the purpose of raising the six pounders, crank, shaft, and cog wheels, altogether from one lid of the tub a sufficient height to turn them on the post contrarily placed in the said tub, forming a half circle by turning them to the opposite side, and letting them down into said tub, all of which I claim as an improvement in a washing machine."

Should any one wish to know more about the foregoing, we refer him to the Patent Office.

47. For improvements in the *Steam Engine;* John Murphy, city of Philadelphia, March 24.

This patent is taken for the manner of constructing a boiler, and for a new mode of working slide valves. The boiler consists of two receptacles for water, which are to be combined together by tubes that are also to contain water. One of the receptacles forms the front, and the other the back end of the boiler, the furnace being contained between them; they consist of shallow sheet-iron boxes, but of the height and width of the furnace, and having their tops and bottoms arched. Numerous tubes extend from one of these to the other, and pass through them, so as to be secured on each side by nuts; they have slots, or openings, through them, within the receptacles, allowing the water to flow freely from one to the other. One row of these tubes is placed under the furnace, so as, in part, to constitute the grate bars. The fire is fed through one of the receptacles, which is perforated, cased, and furnished with doors, for that purpose. A steam tube connects the upper ends, or steam chambers, of the receptacles.

The patentee observes that "In the ordinary mode of working the slide valves in locomotive and many other steam engines, by means of an eccentric, surrounded by a band, or ring, the motion of the valve is continuous; but in the method which I have adopted, the slide is at rest during every quadrant of the revolution of the cam shaft, by which means the admission and escape of steam are greatly facilitated, and the action of the engine improved."

"What I claim as my improvement in the steam engine, is the manner of constructing a boiler, or generator, with two receptacles connected by tubes passing from one of them to the other, formed and combined together substantially in the manner herein described. I also claim the manner of working the slide valve in locomotive or other steam engines, by means of a cam operating in a frame, in the way, and for the purpose, herein set forth; not intending, however, to limit or confine myself to the exact manner of arranging the parts as represented in the drawings, but to vary them as I may think proper, whilst the same principle of action is retained."

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48. For an improvement in *Steam Engines;* Job Sheldon, New Haven, Connecticut, March 24.

This is a rotary engine, in which a piston is to revolve in a circular chamber, or hollow rim, which it is proposed to make about three feet in diameter, ten inches deep, and four inches broad, and it is calculated that this will be a twelve horse engine. One side of the circular chamber forms a wheel, to which the piston is to be attached, and to revolve with it. Upon a shaft connected with this wheel, there is also a balance, or fly, wheel. There are, of course, an induction and an eduction pipe; a hinged valve filling the section of the chamber, and which is to be raised by the piston as it revolves, is placed as in many other rotary engines.

There is but little novelty in the whole arrangement, the engine

being substantially the same with others which have preceded it. None of the difficulties presented in the construction of such engines appear likely to be overcome in this. Such, however, is not the opinion of the patentee, who says that it "is more simple than those in ordinary use;" and if by this he means the rotary engines in ordinary use, we know not where to find them. The claim is, "specially, the stationary circular chamber, and the revolution of the piston therein, and its connexion with the wheels as above described. And also the application of the inner valve, and the discharging orifice, as described."

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49. For an improvement in the art of *Grinding Stone, Glass, and Metallic Surfaces, to perfect and polished planes;* George Cooper, city of New York, March 24.

This "improvement in the art," it seems, means an improvement in the machinery for grinding; the apparatus described appears to be intended for the grinding and polishing of round marble table tops, but is to be employed in grinding articles in other forms, and of other materials. The grinding is to be performed upon a tub wheel, which is so called from its consisting of a round flat surface, with a rim surrounding it like the staves of a tub, and rising vertically from it to the height of six inches. This grinding wheel is to be of cast-iron, and it is made to revolve horizontally by means of a vertical shaft attached to its under side. The upper surface must be perfectly flat, and it is to be one-third more in diameter than the thing to be ground; thus a three foot table top would require a wheel four feet six inches in diameter. Around the wheel, within the rim, there is to be a groove, or gutter, six inches wide, and two deep. When articles of other forms, or sizes, are to be ground, they must be fixed within a circular iron rim of the proper diameter. The wheel receives a circular motion by means of a whirl and band; it is to have sand and water within it, and the article to be ground is placed loosely on it.

To prevent the table top, &c. from being carried round by the wheel, and to give it the requisite revolving motion around its own centre, there are two pulleys which descend from above, within the rim of the wheel, and revolve on axles attached to suitable frame work. One of these pulleys is to stand nearly in contact with the rim of the wheel, is to be about one-twelfth of its diameter, and is to be driven by a band with a speed equal to about three-fourths of that of the rim. The other pulley is to be about one-fourth of the diameter of the wheel, and is turned by the motion of the article to be ground, which is brought up against these two pulleys by the motion of the tub wheel.

"The motion of the pulley, driven as aforesaid, is to be so regulated as to give the table top, &c. the due motion, so as to wear the upper plane surface of the tub wheel equally, and thus, by its own wear, and always keep the plane surface thereof a perfectly level plane."

"The improvements claimed are, the application of a tub wheel

with two regulating pulleys, as hereinbefore described, one of which pulleys being driven by a wheel and a band, thus giving to the marble top, or other thing to be ground, the required rotary motion."

The articles thus ground are to be polished by a similar apparatus, covered with leather, and used with any of the ordinary polishing materials.

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50. For improvements in the *Steam Engine;* Benjamin B. Gates, Ontwa, Cass county, Michigan territory, March 24.

The patentee claims to have invented an improvement in the application of steam as a propelling power; in governing the height of water in steam boilers; and in feeding the boilers. This new application of steam is very old, consisting of a wheel with a hollow shaft, through which steam is to be admitted to the wheel, from the periphery of which it is to be emitted tangentically, and is to drive the wheel by its reaction. The mode of supplying water to a boiler is by a closed cistern, with two tubes connecting it with the inside of the boiler, one of them entering the water, and the other the steam chamber, so that the pressure on the surface of the water in each may be equalized. A third tube from the upper part of the closed cistern enters a cold water reservoir, and by opening and closing the cocks with which the respective tubes are furnished, the supply can be given. This plan has been modified in various ways known to engineers, and that before us, like every other part of the machine, is without the most distant claim to novelty.

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51. For a *Plough;* Nathan Baker, Penn township, Cass county, Michigan territory, March 24.

What is intended to be patented appears to be the curvature of the mould-board, as there are some diagrams referring to this; but there is nothing like a specification, or a claim.

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52. For an improvement in the common *Furnace Stove;* Harvey Hubbard, Berlin, Hartford county, Connecticut, March 25.

This stove is constructed with a view to the increase of the radiating surface, and the patentee says, "What I claim as my improvement, and for which I ask a patent, is the addition of the inner cylinder in the upper part of the stove, with openings into said cylinder at the bottom thereof, communicating with the external air in the manner described, and thus increasing the quantity of heat radiated from the upper part of the stove, and, at the same time, generating heated air in the body of the stove, and diffusing it through the adjoining space in a convenient and economical manner. I claim no other part or parts than those above described, and I do not claim to radiate heat, or generate heated air, in one or more cylinders separated from the body of the stove, as is done in Olmsted's patent stoves."

53. For an improvement in the *Rail-road Car;* John Withers, Bart township, Lancaster county, Pennsylvania, March 25.

This is a repetition of what has been repeatedly proposed, and not unfrequently carried into operation, and afterwards abandoned. Three friction wheels are to be placed so as to sustain each end of the wheel axle, one above, and two on each side, forming the bearings of said axles. It is a little remarkable that a thing so old should again be brought forward; the history of abortive projects, however, is unwritten, and, were it published, but few inventors, we apprehend, would consult it, from a fear that they might meet with unwelcome intelligence.

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54. For improvements in *Rail-road Cars;* James Herron, Civil Engineer, Richmond, Henrico county, Virginia, March 25.

There are several distinct improvements claimed by this patentee, all of which are described in a very full and clear manner, and illustrated by drawings, which leave nothing to desire on this point; it will appear, however, upon examining into the originality of the things claimed, that they are generally old, and have been fully described in this journal, or elsewhere in public works. The following are the claims.

"*Specification 1st.*—In this I claim as being the original inventor of carriages adapted to run alike on the edge railway, and on turnpike roads, as hereinbefore described.

"*Specification 2nd.*—In this I claim as being the original inventor of the *roller flanches* for retaining and guiding carriages on rail-roads, as hereinbefore described.

"*Specification 3rd.*—In this I claim as being the original inventor of the plans hereinbefore described for making the carriages conform to the curves on the railway.

"*Specification 4th.*—In this I claim as being the original inventor of the *friction head*, for reducing the friction of axles, as hereinbefore described.

"*Specification 5th.*—In this I claim as being the original inventor of the *friction band*, for reducing the friction of axles, as hereinbefore described.

"And I distinctly claim the right to apply my improvements, or inventions, herein specified and described, in whole or in part, as the nature of the case may require, to all carriages, cars, wagons, locomotive engines, and other machines."

The thing claimed in the first specification, which is for adapting the wheels to run on common roads, was the subject of a patent obtained by Samuel T. Jones, of Philadelphia, on the 22d of February, 1830; see vol. v., page 151; and also of one obtained by Mr. John Pollock, on the first of October of the same year. The present patentee uses wheels of five feet in diameter, with a flat tread, and without the usual flanch, instead of which "there is placed alongside of each wheel a flat disk of iron, which I term a *roller flanch*, as it is at liberty to revolve on its own axis, entirely independent of the

burthen wheel;" "when the carriages are used for streets, the roller flanches are raised up to the position represented by the dotted circle." Mr. Jones, in his specification, above referred to, says, "I sometimes make my wheels without flanches, and, instead thereof, use friction rollers, fixed upon, or adapted to, suitable arms, or bearings, extending down to the rail, so that the rollers may bear against its side, and perform the office of a flanch." "I construct them so that they may slide up, when the car, or carriage, is about to pass off the rail-road."

The plans claimed for making the carriages conform to the curvature of the railway are two, both of which require that the axles of the fore and the hind wheels should have their bearings on separate rectangular frames, which allow the axles to move from their parallel position, like those of common carriages, by means of the hounds; but in the case before us both frames turn, they being "connected by means of a coupling bar at a point intermediate between the axles, to which bars are attached toothed segments, adapting each pair of wheels equally to the curvature of the road."

By turning to vol. iii., p. 66, it will be seen that the late Dr. Wm. Howard obtained a patent, dated November 22d, 1828, for the application of this principle, which he states in the following words: "The connexion of the two beds of the axles at a point equidistant from each; and in the same manner the connexion between the hind bed of one wagon, and the fore bed of that following it, or the fore bed of the leading wagon with any system of guide wheels, so that the wheels not only of one wagon, but of a train, will follow one another in the same curve, without more lateral friction than when on a straight line." This description is accompanied with plates, to which the reader may turn, and see a full exemplification of the principle.

Under this same head, Mr. Herron refers to a method of using jointed crossbars, instead of the circular segments, by which "the same object will be more simply effected." By turning to the patent of Mr. John Pollock, obtained October 1st, 1830, this coupling by jointed crossbars will be found represented in a drawing, together with several other things which the present patentee deems to be new, and among them the making the wheels without flanches, that they may run upon common roads; see vol. vii., p. 17.

The "friction bands," mentioned by the patentee as claimed under his fourth specification, are hoops, or rings, of iron, by means of which the carriage frames are suspended below the axles of the burthen wheels; these hoops pass over the prolonged ends of the axles, and under friction rollers upon the frame of the carriage, and are to roll around by the friction of the axle upon them, in the manner, though not for the purpose, of Winan's friction wheels. It will be found in practice that these hoops will frequently stand still, and allow the axle to turn within them, as has often been the case with Winan's wheels, which have in several instances been cut through by this means. Besides this, the idea of suspending the load upon revolving rings is not new; N. Finlay, of Baltimore, suspended the load in this

way; see the notice of his patent, dated October 27th, 1829, at p. 36, vol. v.

The cranked axle mentioned in the fifth specification is intended to allow the load to extend below the axis of the load wheels. This has been effected by Samuel T. Jones, in a car patented by him, and described, volume v., page 149; it has also been effected by others. We could have cited other authorities, also, in most of the cases above noticed, with some of which we opine that it would be well for civil engineers to make themselves acquainted.

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55. For the *Preparation of Chewing Tobacco;* Edward Chassaing, city of Baltimore, March 25.

The tobacco manufactured by the patent process is denominated "*Natural Roanoke Leaf,*" and it is thus prepared; 250 lb. of the best Virginia tobacco is to be sprigged in the usual manner, and sprinkled with a mixture made by boiling 3 lbs. liquorice, 2½ lbs. prunes, 1 lb. figs, 1½ lb. table salt, ⅓ gall. Jamaica rum, and 4 galls. water. The liquid is to be strained, and water enough added to make the liquid amount to four gallons. The tobacco is then to be lightly pressed, as discoloration would be produced by heavy pressure.

The claim is to "the manufacture of chewing tobacco in the manner hereinbefore described."

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56. For *Swivel Blinds for Doors and Windows;* Seril Steere, Gloucester, Providence county, Rhode Island, March 25.

The slats of blinds, it is said, are usually turned by a rod on their inside, each slat being fastened to the rod by a snipe bill. The mode adopted by the patentee is to have a rod at the side of the frame, passing up the ends of the slats, and a pin from this rod to pass into each slat, close to one edge, so that, by raising or lowering it, the slats will swivel on the pivots of each wheel pin which enters the frame. If the patentee had been much of a traveller, we think that he would not have applied for this patent; this mode of fixing blinds is common at the city of Washington.

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57. For a mode of *Applying the Pendulum Power to Propelling Machinery;* Abraham Wade, South Eagle, Allegany county, New York, March 25.

That is, in other words, the applying of nothing to do something, and reversing the maxim, that from nothing, nothing comes. The specification of this imaginary invention occupies six closely written pages of foolscap, but we are disposed to dismiss the whole affair in about double the number of lines; and if estimated by its merits, even these would be more than its share. Four heavy weights are represented as suspended to rods, and from these palls take into ratchet wheels to propel the main driving wheel, which in its turn is to drive any machinery. The directions for building the machine are as absurd as the plan itself; thus, for example, we are told that the "pendulum rod is to be twelve feet and fifteen-sixteenths of an inch in length," and that the rods are "to be connected together by a piece

of timber five feet one inch and seven-thirteenths of an inch in length." It is "to be kept in motion by human strength, horse, water, or other power," and most assuredly it will need it.

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58. For a *Leather Finisher;* Cuchman Bassett, Boston, Massachusetts, March 25.

The machinery described is to be applied to the "finishing of morocco and kid skins; breaking goat and other skins; softening and graining, commonly called boarding, skins; also for working all kinds of hides used in curried leather, and finishing the same." The description is not drawn up by one acquainted with machinery, and the drawing is a mere outline, but imperfectly representing the apparatus. The intention of the machine, however, is to give a vibratory motion to a shaft, in the end of which there is placed a brush, roller, slicker, grainer, or other instrument, which is to be passed over the leather. There is no claim made, and as there are patents for the same purpose, in which machinery very similar to that intended to be described is employed, we dismiss the affair until more light is thrown upon it.

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59. For an improvement in *Saw Mill Dogs;* Martin Rich, Caroline, Tompkins county, New York, March 25.

Mr. Rich had, previously to this date, obtained at least four patents for sawmill dogs, and we see by the list that a fifth is to follow in a day or two; we hope that the breed is sufficiently in demand to pay something more than the expenses of accouchement. The racks, pinions, teeth, levers, and other appurtenances, which are combined together to effect the purposes intended, can be understood only by the drawing, which we do not think it necessary to give.

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60. For a *Plough;* William Hess, Lower Saucon, Northampton county, Pennsylvania, March 27.

"The improvement for which the patent is asked consists in, 1st. The flanch on the mouldboard behind the share, to prevent that part of the plough cutting in the furrow, and thus running heavy. 2d. The running the landplate back to the plough handle, and attaching it to the handle, and extending the cutter back to the handle, by which the plough is strengthened, and the earth will not fall over the landplate into the furrow. 3d. In extending the land side of the share back to the plough handle, and attaching it to the land plate near such handle, by which the plough runs lighter, and there is less trouble in working from the whole of the land side to the share being in one piece." There are no references to the drawing.

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61. For a *Machine for Extracting Hair from Skins;* S. G. Ladd, assignee of S. Graham, Farmington, Kennebec county, Maine, March 27.

This machine is furnished with several rollers, between which the skin is to pass, in order to its being presented to a revolving knife,

by which the hair is to be cut off. The claim is to "the application of the revolving knife, the elastic and other rollers, to this purpose, as well as the general arrangement of the several parts of the machinery, and their application to effect the purpose designed, as specified and described." If memory serves us correctly, the terms of this claim are too broad and general, as we believe that skins have been passed between rollers, and the hair separated from them, by revolving knives, prior to the obtaining of this patent.

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62. For an improvement in the *Construction of Saw Mills;* Nathaniel Crosby, and Pearson Crosby, Pomfret, Chautauque county, New York, March 27.

The only thing claimed in this patent is the application of a balance wheel, or weight, on the crank shaft of a saw mill, as a counterpoise for the weight of the crank, pitman, and saw-gate, and thereby to equalize the motion.

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63. For a *Washing Machine;* Ezra Whitman, Jr., assignee of Ezra Whitman, Winthrop, Kennebec county, Maine, March 27.

This washing machine consists of a round tub, which has a vertical shaft in its centre, to this shaft dashers are attached, which are formed of round pieces of wood, and extend nearly to the inner periphery of the tub; there are also fixed dashers, of a similar construction, fastened to the inside of the tub, and extending nearly to the shaft; the suds and clothes are put into this tub, and the shaft made to vibrate backwards by means of a lever, thus squeezing the clothes between the dashers. Churning, it is said, may also be performed by this machine. The claim is to "the arrangement of the dashers, and the mode of putting them in motion."

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64. For a *Machine to Propel Cradles and Churns;* Ezra Whitman, Jr., Winthrop, Kennebec county, Maine, March 27.

The cradle, or churn, is merely made the pendulum part of an ordinary escapement, operated upon by a weight, the movement being contained in a suitable case. Hundreds have conceived the same project, and several have been wise enough to obtain letters patent for it, which is usually the last we hear of it in each individual case; but, after a time, it is again hatched in some broody brain, and again forgotten.

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65. For an *Inking Machine,* for the hand printing press; Samuel Fairlamb, and John L. Gilpin, city of New York, March 27.

This apparatus resembles, very closely, some of those which we have previously noticed, as intended for the same purpose. The claim made is to "the *manner* of applying an *elastic* scraper to effect the regulation of the printing ink; and the *manner* of applying gravitating substances, or heavy bodies, to propel inking rollers over a

form of type." Thus limited, we see nothing adverse to the sustaining of the claim; but there does not appear to us to be any improvement in the general construction of the machinery, calculated to remove the objections which, after a fair trial, printers have urged against it. It is more subject to be out of order than a roller boy, and is not so easily replaced; it does not work so equally as a good boy, and when it works badly, it is of no use to beat it. These observations apply, not specially to the particular machine before us, but generally to all of a similar kind which have been brought into use.

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66. For an improvement in the *Flat, or Sad, Iron;* William Wilson, Greenfield, Franklin county, Massachusetts, March 27.

Instead of using a wrought-iron handle laid in the flask, and embraced by the cast-iron, a dovetail groove, or mortise, is cast on the upper part of the iron, and a cast-iron handle, with a part corresponding to the dovetail groove, is made to slide into it.

"What is claimed as a patent, is the manner of affixing the handle to the flat, or sad, iron, by means of the tenon and mortise, in form of a dovetail, in manner before described; and the making of the handle of cast-iron separate from the sad iron, and having the tenon joined to it as aforesaid, and cast at the same time with the handle."

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67. For *Saw Mill Dogs;* Martin Rich, Caroline, Tompkins county, New York, March 27.

These are called gauge dogs, as they are intended to regulate the thickness of the stuff to be sawed, which they do by means of screws moving the log on the head and tail blocks. They are so constructed that, if desired, the log can be cut completely through, leaving no stub-shot. There is no claim made, and as gauge dogs have been previously constructed, and operated upon by means of screws, it would have been proper for the patentee to have pointed out the specific difference between the present and former plans; the law, indeed, requires that this should be done.

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68. For the *Manufacture of Metallic, or Steel, Pens;* Peregrine Williamson, city of New York, March 30.

The claims made to this improved pen are several.

"1st. So to unite and combine the nib and holder, as to form a pen producing all the effect of the celebrated pen invented by me in 1809, which had three slits, by so arranging and applying a nib, having one slit, that the three slits, with their full effect, necessarily result from the combination.

"2nd. The graduating slide, which adjusts and regulates, with the utmost nicety, the greater or less flexibility of the pen.

"3d. The application of the metallic regulator, or adjusting slide, to every form or description of pens to which the principle is, or can be, applied.

"4th. The application of the fountain to the holder, instead of applying it to each nib separately, and which application can only be upon my present plan of blending the nib and holder in such a manner as to form together a complete and perfect pen.

"5th. The mode of tempering the nib so as to preserve the extreme points hard, and the increased substance at the points, which both give additional durability to the instrument, and render its action on the paper smooth.

"6th. The mode of compressing or upsetting the points, so as to give to the pen the increased substance at the point."

The mode of tempering alluded to is the inserting the extreme point of the nib in a small hole in a mass of cold metal; the nib then being held over a lamp is blued, whilst the points remain perfectly hard. The points are to be thickened by leaving the nibs sufficiently wide to be upset in a press, so as to double the thickness at the point.

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69. For an *Inflating Pump;* Charles Goodyear, city of Philadelphia, March 30.

This instrument is misnamed in being called a pump, as it is merely a tube, with a piston and valve of a particular construction, intended to be used in inflating life preservers, pillows, mattresses, and other air tight articles, which it is wished to fill with air by means of the mouth, or a pair of bellows. When the mouth, or bellows, is applied to the tube through which the air is to pass, the finger is used to force down a small piston rod, which opens a valve, and makes a free communication with the article to be inflated. The particular construction of the instrument it is scarcely necessary to describe; we think it more complex than necessary, and see no reason why a simple tube, covered with a strip of bladder, or oiled silk, in the manner of the air pump valve, should not answer the whole intention equally well.

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70. For an improvement in the *Horse Power, and in its Application to Thrashing Machines;* Christian Custer, and Daniel Pennypacker, Upper Providence, Montgomery county, Pennsylvania, March 30.

"Those parts of the machine which the petitioners claim as having been invented by them, are, *first*, The wooden floor where the horses walk. *Second.* The application of the small wheels over which the floor passes, and the arrangement of the gearing, with the mode of applying it to the machine. *Third.* The small wheels. *Fourth.* The advantages of the inclined plane. *Fifth.* The machine not being limited in its horse power."

Where five claims are made, one is justified in looking for some novelty, but we have not found it, nor have we seen any thing to induce us to look for it again. The horses are to walk upon an inclined endless floor, exactly like numerous others; its exact length and width are given, and if the horse power is unlimited, it must be by piling them upon each other. In describing the gearing by wheels

and pinions, their precise diameters are prescribed, and most probably there is not another horse power exactly like it in this particular.

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71. For a machine for *Hulling Cotton and Rice;* Jirah Kellog, New Hanover county, North Carolina, March 30.

The claim made in this patent is to "the construction of the rasping wheel and plates; their use and method of application to hulling cotton seed." The rasping wheel is a cylinder covered with hard metallic points, between which and the plates, similarly armed, the seed is to be hulled, being fed between the two by a hopper. The hulling plates are similar to, and take the place of, the concave in many thrashing machines.

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72. For a Power Augmenting Engine; Andrew Ochler, Eastville, Northampton county, Virginia, March 30.

This machine belongs to the class of incomprehensibles, as might well be supposed from its title; and although, in examining such machines, the idea which exists in the mind of the inventor can generally be perceived, although it may be destitute of rationality, we are not, in the present instance, quite sure that we can do even this. It seems, however, that there are to be two inclined planes on the platform of a carriage, and that by means of a lever worked like a pump handle, a roller is to be made alternately to ascend and descend these inclined planes, and that power is to be thus obtained to drive a locomotive, move a house about upon wheels, work a saw, and do many other things where power is required. We have more than once believed that we had witnessed the capping of the climax of absurdity in imaginary mechanical inventions, but we have as frequently been rebuked for entertaining such an opinion, and never more forcibly than in the present instance.

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73. For a *Thrashing Machine;* William W. Ross, Chillisquaque, Northumberland county, Pennsylvania, March 30.

Although this is called a patent for a thrashing machine, there is no attempt whatever to claim any part of this apparatus, which is well enough, as there is not any thing in it which could rightfully be claimed. The description is devoted quite as much to a horse power, not mentioned in the title, by which the thrashing machine is to be driven, and the claim refers to this only, being in the following words: "What I claim as my peculiar invention, is the mode in which the driving power is applied by the before described cones and chill boxes. I also claim the method of reversing the motion of the machine, when the teeth are worn out on one side."

The denominations of cone, and chill boxes, are entirely misapplied, and refer to wheels and pinions on the horse power—no part of the patent.

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74. For apparatus for *Closing Doors, Gates, &c.;* Oliver Davidson, Ballston Spa, Saratoga county, New York, March 30.

A roller, fixed to the casement or framing of the door, is to bear against it; the roller is attached to a compound lever, working on a rule joint. The patentee says that "The application of power by this mechanical contrivance, for the purpose within specified, is new, and I claim to be the inventor."

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75. For *Galvanic Apparatus, applied to Cavities of the Human System;* Daniel Harrington, city of Philadelphia, March 31.

This patent is obtained for some new modifications of the galvanic apparatus, applied to the cure of diseases, several of which have been previously patented by the same gentleman. As the principle of action does not vary essentially from some of which we have given specifications, we deem it unnecessary to give a particular description of these new forms of the instruments employed.

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a Patent for an improvement in the Mode of Sustaining the Weight, and Applying the Power, in Wheeled Carriages. Granted to SAMUEL CHAPMAN, JR., *Windsor, Berkshire county, Massachusetts, March 2nd,* 1835.

To all whom it may concern, be it known, that I, Samuel Chapman, Jr., of Windsor, in the county of Berkshire, and State of Massachusetts, have invented an improvement in the mode of sustaining the weight, and applying the power, in wheeled carriages. And I do hereby declare that the following is a full and exact description thereof.

My invention is applicable either to carriages upon common roads, or upon rail-roads; and also to those with two, or with four wheels, and consists in suspending the load so that it shall act against, and be sustained by, the peripheries of wheels upon the same axes to which the road wheels are attached, or, when the invention is applied to rail-roads, upon the peripheries of the road wheels themselves.

In constructing rail-road cars upon the principle adopted by me, the wheels are to be made, and placed upon axles, in the usual way; one or both of these wheels, however, may be left free to revolve upon the axle, to allow of a more free motion upon curves than when both wheels are firmly fixed. The axles themselves are not to be attached in any way to the car, no boxes, or bearings, such as are ordinarily employed, being required, or admissible; the whole connexion between the car and the road wheels being made through the intervention of large friction, or *driving*, wheels, to be presently described.

To a frame which is to sustain the body of the car, or carriage, I attach friction, or *driving*, wheels, a pair to each car wheel, in such a situation that their peripheries may rest upon the periphery, or tread, of the car or road wheel, at about ninety degrees from each

other, and equidistant, or nearly so, from the apex of the car wheel. The faces of these friction, or driving, wheels, are to be adapted to those of the car wheels, and they may, if found necessary, be furnished with flanches similar to them, and embracing their unflanched sides. It is manifest that, in a car thus constructed, the whole weight thereof, with its load, will rest upon the upper part of the peripheries of the road wheels, their axles serving no other purpose than to keep each pair of wheels in their proper positions, as related to each other.

In applying the same principles to carriages on common roads, it will not be proper to allow the faces of the friction, or driving, wheels, to run in contact with the road wheels; but in this case I fix secondary wheels upon the same hubs with the road wheels, and, usually, at a small distance within them. These secondary wheels must be so much smaller in diameter than the road wheels, as may be necessary to keep them free from the dirt and obstructions upon the road. They have, in general, flanches rising from each of their sides, above their faces, so as to form a groove, to receive, and check the lateral motion of, the friction, or driving, wheels, which are to rest upon them; they revolve on gudgeons affixed to the frame work of the carriage, and transferring the bearing of the load on to the peripheries of these secondary wheels, which being firmly fixed on the same hubs on which the road wheels are placed, produce the same effect as though they actually rested upon the road wheels, abating the difference in their diameters.

In a four wheeled carriage, which must be made capable of turning abrupt curves, the frame work which sustains the friction or driving wheels of the fore and the hind wheels must be detached from each other, allowing them to play upon a perch in the common manner, or in any other which will admit of the same effect being produced.

In order to keep the wheels in their places upon common roads, where they are liable to sudden jolts, I place two smaller friction wheels upon the frame work of the carriage, at situations diametrically opposite, or nearly so, to the friction, or driving, wheels. These friction wheels need not be more than five or six inches in diameter, as, although they are near to, they do not actually touch, the faces of the secondary wheels, unless they are brought into contact to check the tendency of the upper, or driving, wheels, to move out of their places in consequence of the road wheels meeting with obstructions, against which they strike.

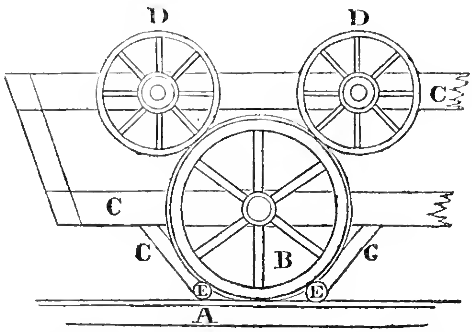
I have thus fully exemplified the principle upon which I intend to construct cars, or carriages, either upon rail, or common, roads; and it is my design, also, to apply the same to locomotives; but in doing this, the driving, or friction wheels, and also the secondary wheels, are to be furnished with teeth, or cogs, upon their peripheries, so that the action of the engine may cause them to slip round upon each other. These secondary wheels may be cast, and made one with the road wheels.

What I claim as my invention, and for which I ask letters patent,

is the sustaining of, and applying the power to, cars, carriages, or locomotives, upon the peripheries of road, or secondary wheels, upon the principle, and in the manner, herein set forth; not intending, however, to confine myself to the precise arrangement of the several parts as set forth, but to vary the same in any way which I may find convenient, whilst I attain similar ends by means substantially the same.

Samuel Chapman, Jr.

A, rail.
B, car wheel.
C C, frame of the carriage.
D, driving wheels.
E, friction wheels.



Remarks by the Editor.—We have not published the foregoing specification from a conviction of the utility of the thing patented, as, on the contrary, we are aware that the patentee is entirely erroneous in his views; of this opinion he was aware at the time of obtaining his patent; but, like some other intelligent men, he appeared to labour under a temporary hallucination, a certain cure for which, however, would be found in the attempt to put the thing into practical operation; whether or not this has been done, we have not heard; the news of its success, we presume, would have reached us.

Specification of a Patent for an improvement in the method of Casting Chilled Iron Rollers. Granted to James Harley, *city of Pittsburgh, Pennsylvania, March 2nd,* 1835.

To all to whom these presents shall come, be it known, that I, James Harley, of Pittsburgh, in the county of Alleghany, and state of Pennsylvania, have invented a new and useful improvement in the "mode of casting chilled rollers, and other metallic cylinders and cones," and that the following is a full and exact description of the construction and operation of said machine, or improvement, as invented or improved by me.

In order to show the object of my improvement, I state the usual method as now practised in casting chilled rollers, as follows. The mould in which they are cast consists of a main central portion, formed by a hollow metallic cylinder; and the two ends, called journals, and couplings, which are moulded in sand.

Now, if the metal be poured into such a mould in the usual manner that is, through a tube descending to its lower extremity, the motion thus communicated to it, as it rises in the mould, tends to throw all the sand, dross, slag, &c., towards the external part of the roller, and thereby occasions cracks, flaws, and other imperfections on its surface; therefore, in order to obviate this injurious tendency, it is the custom to stir the fluid metal with a rod, so as to give it a rotary motion, in order, by this stirring, to bring the light substances to the centre. But this operation of stirring is dangerous, and does not effect its object with certainty.

My method of construction is, to insert a pipe, or pipes, (which may be called gates,) at openings into, or near, the bottom of the main chill cylinder, or near the inner surface of the said cylinder; and the line of direction of said pipes, or gates, is not to be that of a perpendicular to said bottom, or inner surface, but that of an oblique, or slanting line, usually equal to about thirty degrees, that is, approaching the direction of a tangent to the cylinder. Beneath these openings, by which the pipes enter the main chill cylinders, is to be formed a circular chamber, with as many openings as there are pipes to communicate with the openings into the cylinder, and the pipes are to connect this chamber with the cylinder in the oblique, or slanting, direction above described; it is also advantageous to have this circular chamber closed by a partition across it, on one side of the opening in the circumference, left for the insertion of the descending tube, by which the fluid metal is to be poured in.

This is the construction of my improvement; the manner of using it is as follows. The melted metal is poured in at the descending tube, by which it arrives at the opening at the bottom of this tube leading into the circular chamber; here the metal enters, and on one side being arrested by the partition closing the chamber at the side of this opening, the stream, or course, of the metal will be driven to the other, and, consequently, continued round. The partition is to be so placed as to give the course of the stream in the same direction round as that to which the pipes, or gates, lean.

The metal flowing up these inclined tubes or pipes, acquires a rotary motion on entering the main cylinder, which is the object I wish to attain, thereby preventing the necessity of stirring with a rod; and this rotary motion is necessary, in order to bring the light substances to the centre, and throw the heaviest and best metal to the circumference.

What I claim as my own invention, and not before or previously known, in the above described machine, or improvement, is, that the tube, or tubes, or passages, called gates, through which the metal is to be conveyed into the mould, shall not enter the mould perpendicularly at the bottom, but slanting, or in a direction approaching to a tangent of the cylinder; or if the gates enter the mould horizontally, or nearly so, that they shall not enter in the direction of the axis of the cylinder, but in a tangent from, or inclining towards a tangent of the cylinder.

JAMES HARLEY.

Specification of a Patent for dressing the faces of Metallic Mills. Granted to Samuel G. Reynolds, *Providence, Rhode Island, March 18th,* 1835.

To all whom it may concern, be it known, that I, Samuel G. Reynolds, of Providence, in the county of Providence, and state of Rhode Island, have invented an improvement in the mode of facing, furrowing, picking, or dressing, the disks, or disk-like faces, of metallic mills, by means of which improvement such mills are rendered much more efficient than any of those heretofore constructed; which mill, so improved, I denominate the File mill. And I do hereby declare that the following is a full and exact description thereof.

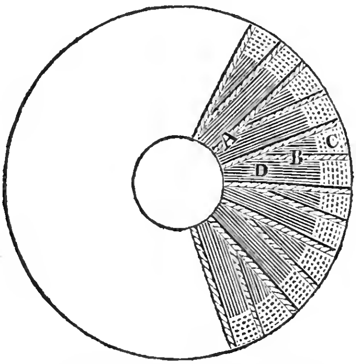
I make the grinding part of my mill, in general, round, and flat, like the stones of the common grist mill. The surfaces of the two disks may be each of them flat, or rather slightly concave; or one of them may be, to a certain degree, conical, or convex, the other being adapted thereto so as to bear the same relationship to it, as the two flat, or nearly flat, disks do to each other, in which case their operation will be substantially the same. One of these disks is to be a runner, and the other is to be stationary; or if three disks are used, the middle one is a runner, whilst the other two are stationary. As neither the position, the number of disks employed, nor the variations in the flatness of their surfaces, above alluded to, makes any difference whatever in the principle of action, I shall confine myself, for the purpose of description, to a mill consisting of two disks, placed horizontally; and more particularly to the manner in which the disks are dressed and furrowed.

The disks may be made of iron, or steel, and may be either hardened, or left soft; I prefer, however, to make them of wrought iron, and to leave them soft, as I have proved by experiment that they will run for a very considerable length of time without requiring to be sharpened, or picked, and that when they do require it, that it may be done with very little labour; whilst, when hardened, the labour and risk of softening, sharpening, and rehardening them, are very considerable.

The disks which I employ are rarely made to exceed fourteen inches in diameter; twelve inches I deem a medium size, and they should be about one inch in thickness. The manner of dressing and furrowing them is represented in the cut. I usually make in them about sixteen furrows, A, leading from the eye to the periphery, and an equal number of branch furrows, B, all having a direction similar to those in the stones of ordinary grist mills. The direction of the bevil of these furrows, and the cutting upon them, to be presently described, constitute an important feature of my invention.

I make the furrows about one-fourth of an inch in depth, and shape them so that the bevil of those on the runner disk is on that side of each furrow which is opposite to the motion; whilst those on the bed, or stationary disk, are in the reverse direction. The intention of this

is to cause the grain to glide over, and rise easily up the bevils on to the lands, instead of being thrown too quickly out by the centrifugal force consequent upon the very rapid motion of the runner. Notwithstanding this provision, however, the too rapid discharge of the grain would take place, were it not for another provision to be now described. It will be seen in the drawing, that the furrows are represented with hatched lines crossing them obliquely; these are intended to show the float teeth, bars, or grooves, contained in the furrows, to obstruct the passage of the grain, and to cause it to rise up the bevils, or inclined planes, of the furrows, with the greater certainty. What I esteem the best way of forming these, is to take a cold chisel, and to cut float teeth from the deepest point of the furrows, inclining towards the periphery, at an angle with the furrow of about forty-five degrees. The chisel is to be so held that the edges of these teeth may incline towards the centre of the disk. It is manifest that the purpose for which these are cut, namely, the partial obstruction of the course of the grain outwards, and the directing it up on the lands, may be attained by variations of this provision, but the principle and design are sufficiently apparent.



The lands I cut up file fashion, the fineness or coarseness of the cutting depending upon the nature of the material to be ground; that portion extending from the eye to within one or two inches of the periphery, I cut in the form of long float teeth, D, running in a direction parallel with that of the branch furrows; the edges of these teeth are inclined with the motion of the runner, or so as to produce a direct cutting effect; those on the bed plate being, of course, reversed. The remaining portion, C, I cut rasp fashion, taking a sharp pointed punch, (a prick punch I have found to answer the purpose,) and holding it with such an inclination as shall give to the teeth formed thereby, the same direction with the float teeth. To a mill of this description I give, in order to the production of its full effect, about two thousand revolutions in a minute.

I do not claim to be the inventor of mills for grinding by means of metallic disks, furnished with grooves and furrows, these having been previously known and used; but what I do claim, and wish to secure

by letters patent, is the manner of obstructing the passage of the grain along the furrows, and directing it up the bevil on to the lands, by means of the float teeth, or other analogous obstruction made therein, for the purpose, and upon the principle, herein described. I also claim the combining together the different modes of dressing the faces of the disks, so as to form the cutting or grinding surfaces as herein described.

SAMUEL G. REYNOLDS.

Remarks by the Editor.—We have not heard any thing respecting this mill since the date of the patent, but at that period one of them was brought to Washington, and put into operation in the neighbourhood; we did not see it at work, but persons who did, and who are well acquainted with the manufacturing of meal, were surprised at the goodness and the quantity of the work performed by it, and were induced to speak highly of its merits, although much prejudiced against it previously to witnessing its operation. The disks, we think, did not exceed nine inches in diameter.

Specification of a Patent for an improved mode of making, or preparing, the Pannels for Coaches, and other Wheeled Carriages. Granted to EBENEZER A. LESTER, *Machinist, Boston, Massachusetts, March* 18*th*, 1835.

To all whom it may concern, be it known, that I, Ebenezer A. Lester, of the city of Boston, in the State of Massachusetts, have invented a new and improved mode of making, or preparing, the pannels for coaches, and other wheeled carriages, or vehicles, in which pannels are employed. And I do hereby declare that the following is a full and exact description of my said invention, or improvement.

My improvement consists in making the pannels of metal, instead of wood; and for this purpose I prefer to use sheet iron, as combining lightness and strength, whilst it is less costly than most of the other metals. Sheets of zinc, copper, or other metal, or metallic alloy, may also be used. The frame for the insertion of the pannel may be grooved in the usual manner, and the pannel, properly raised and formed, inserted in these grooves when the frame is put together; the pannels are then to be painted and finished. I intend sometimes to finish such pannels by japanning them, as tea trays and other articles are japanned; and in this case it will be best, instead of grooving the frames, to form rebates therein, so that when the body of the carriage, or other vehicle, has been completely painted and varnished, the pannels can be put into the frames from within, and secured there by means of strips of wood, or metal, or in any other manner which may be found convenient. As, from the motion of a carriage, the pannels are subjected to a degree of friction which might remove the painting, or japanning, so that the edges of the metal would rust, or corrode, by the insinuation of moisture; to prevent this, I intend to insert into the groove, or rebate, some elastic material, such as

India rubber, India rubber cloth, or any other substance which may answer this intention.

I have thus described, in a manner sufficiently full to direct a competent workman, the nature of my said improvement, and the manner in which I intend to carry the same into effect; and I do hereby declare that what I claim as my invention, or improvement, is simply the making of the pannels of coaches, and other wheeled carriages, or vehicles, of metal, instead of wood, no other change being made in the formation of such carriages, excepting such as may be necessary to adapt the frame-work to such pannels.

EBENEZER A. LESTER.

Report to the Directors of the London and Birmingham Railway Company, accompanied by Experiments on the Transverse Strength, &c. of Malleable Iron, with reference to its use for Railway Bars. By PETER BARLOW, *Prof. Royal Mil. Acad., Woolwich.*

(Concluded from p. 199.)

Comparative Strength of differently formed Parallel Rails.

Let A B C D (fig. p. 265) represent any rectangular rail with a bottom table; $n\ n$ its neutral axis; c the centre of compression, $c\ n$ being $\frac{2}{3}$ of $h\ n$. Now, the tension of each fibre being as its distance from the neutral axis, and that of the lower fibre being given equal to t, the tension at any variable distance x will be $\frac{t\,x}{d}$ (d being taken to denote the whole depth $n\ s$,) and therefore the sum of all the tensions will be $\frac{t}{d'}\int x.\,d\,x$ (1) which, therefore, become known, x being taken within its proper limits, according to the figure of the section.

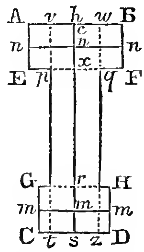
But as the effective resistance of each fibre is also as its depth below the line $n\ n$, the sum of all the resistances will be $\frac{t}{d'}\int x^2 .\,dx$ (2) x being taken here also within its proper limits. And then to find the centre of tension, or that point into which, if all the tensions were collected, the whole resistance would be the same as in the actual case, this would be given by the formula, $\frac{\int x^2.\,d\,x}{\int x.\,d\,x}$ (3) which is precisely the expression for the centre of oscillation of a disc of the same figure.

We have hence the following general rule for finding the resistance or the weight which any given bar or rail will support at its middle point, within the limits of its elastic power, that is,

Calling the integral of formula (1) = A
Ditto ditto formula (2) = B
Ditto ditto formula (3) = D
And the distance $c\ n$ = C

then, referring the sum of all the resistances B to the common centre of compression, we have $D : D + C :: B : \frac{B(D+C)}{D}$ which is the whole effect.

For those who understand the integral calculus, this solution is sufficient; but as this article will, probably, be consulted principally by practical men, it will be more convenient to give a specific solution for a rail, embracing under one general figure all the usual forms, the only variations being in the depth, breadth, and thickness, of the parts.



Let A B C D represent such a section, of which all the dimensions are given, as also the position of $n\,n$ the neutral axis, the point c which is the centre of compression, $c\,n$ being two-thirds of $n\ h$, and the point m which is in the centre of $r\ s$. The breadths $n\,n$ and $m\,m$ are also known. Then the resistance of the whole section referred to the common centre of compression c, may be considered to be made up of the three resistances.

1st. Of the middle rib, continued through the head and foot tables, $v\ t\ z\ w$.

2nd. Of the head A E F B, minus the breadth of the centre rib.

3d. Of the lower web, G C D H, also minus the continuation of the centre rib.

Now, t being taken to represent the tension of iron per square inch, just within its limits of elasticity, we shall have:

1. Resistance of $v\ t\ z\ w = \frac{1}{3}\, h\, s\, .\, n\, s\, .\, p\, q\, .\, t$

2. Resistance of A E F B $= \frac{1}{3}\, h\, x\, .\, n\, x\, .\, (n\, n - p\, q)\ \frac{n\, x}{n\, s}\ t$

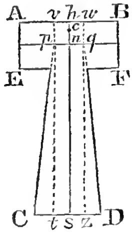
Now, let $n\, m + \frac{r\, s^2}{12\, n\, m} = \delta'$, and $\delta' + c\, n = \delta''$, then

3. Resistance of G C D H $= n\, m\, .\, r\, s\, .\, (m\, m - p\, q)\ \frac{\delta''}{d'}\ t$

These three resistances being computed, let their sum be called s, and the clear bearing l; then $\frac{4\, s}{l} = w$, the load the bar ought to sustain at its middle point, for an indefinite time, without injury to its elasticity.

Trapezoidal Rail.

Produce the sloping sides till they intersect the neutral axis in p q. Then the rule for the head A E F B, and middle rib, $v\ t\ z\ w$,



will be the same as given above; and for the two sides, p C t, q D z, the formula is,

$$\frac{1}{3}\left(\frac{3}{4} n s + c n\right) \times (\mathrm{C\,D} - p\,q)\, n\, s^{*}\, t.$$

The sum of this, with that of the head and middle rib, multiplied by 4, and divided by l, as before, will be the weight required.

Another general and very curious mechanical method of finding the resistance of a railway bar, is also suggested by the remark in p. 264, viz: that the centre of tension is the same as the centre of oscillation of a disk of the form of the section, cut off at its neutral axis, which in words may be given as follows:

Find the centre of oscillation, and the centre of gravity, of the area below the axis, by the usual mechanical methods, and call the distance of the former below the neutral axis o, that of the latter g, the area a, the depth d', and the distance $c\,n = c$, the tension t, and bearing l, as usual, then the weight the bar will support will be,

$$w = 4\frac{(o + c)\, a\, g\, t}{l\, d'}$$

The preceding rules, however, will be generally more convenient, particularly when some of the dimensions become fixed, as necessarily happens in such cases as we are considering. For instance, whatever figure may be given to the transverse section, the head may generally be supposed to occupy two-fifths of it; and, therefore in the larger rails, to have about two inches section, and to be one inch deep, that the lower web, when there is one, is the same depth as the head, and that the neutral line bisect the head, or upper table.† With these as fixed dimensions, the preceding formulæ, page 265, are reduceable to words at length. They apply, however, only to the larger rails; for other cases, it will be best to have recourse to the general rules.

* This includes the small dotted part of the triangular sides in the head and in the sides, but the amount is so very inconsiderably in error, as to be nearly or wholly insensible in the result.

† We have the means of computing the position of the neutral line by the data obtained from the experiments, p. 193, which show that in rectangular bars the area is divided in the ratio of 1 to 4, or the area into the distance of the centre of gravity of the two parts as 1 to 4^2. But in inquiries of this kind, the less we have to depend on theory the better. I have, therefore, deduced the above position from the experiments on actual railway bars, p. 270, by considering the distance $n\,h$ as unknown, and equating the formula in this shape with the mean elastic strength, which is found to be $8\frac{1}{4}$ tons. The equation is, therefore,

$$\frac{1}{3}\left\{5\,(5 - x)\,9 + \frac{11.\,(1 - x)^2}{5 - x}\right\} = \frac{8\frac{1}{4} \times 33}{4}$$

Whence we find $x = .47$, which may be considered as $.5$, without sensible error.

Resistance of the Head, or Upper Table.

1. Subtract the thickness of the middle rib from 2 inches, and multiply the remainder by 10.

2. Subtract half an inch from the whole depth, and multiply the remainder by 12.

Then the former product, divided by the latter, will be the resistance in tons due to the head, not including the continuation of the middle rib.

Resistance of the Centre Rib.

Multiply the whole depth of the rail by the whole depth, minus half an inch, and that product by 10 times the thickness of the rib; and the last product divided by 3, will be the resistance in tons of the middle rib continued through the whole depth, *i. e.*, through the upper and lower tables."

Resistance of the Lower Web.

1. Multiply the whole depth of the rail, minus 1 inch, by the thickness of the bottom web, minus the thickness of the rib, and that product by 10.

2. From the whole depth of the rail subtract 1 inch, and to 12 times the square of the remainder add 6 times the remainder, and call this the first number. From this subtract twice the remainder, and add 1, and call this the second number. Then say, as the first number is to the second, so is the product obtained in the former part of the rule to the resistance of the lower web, not including the continuation of the middle rib.

Lastly, the sum of these three resistances multiplied by 4, and divided by the clear bearing length, will be the weight the rail will sustain without injury. A few examples, worked at length, are given below, to illustrate the rules.

Examples.

(1) In Mr. Stephenson's rail the greatest depth is 5 inches, with a plain rib, whose thickness is .9 of an inch. Here,

Resistance of Head $\left\{\begin{matrix}(2-.9)\times 10 = 11)\\(5-\frac{1}{2})\times 12 = 54)\end{matrix}\right\}\frac{11}{54} =$ 0.20

Ditto of Rib, . $\dfrac{4\frac{1}{2}\times 5\times .9\times 10}{3} =$ 67.50

67.7

And $\dfrac{4\times 67.7}{33} = 8.21$ tons, the greatest weight.

Deflection with this weight $\dfrac{.22}{4\,.\,5}\times\dfrac{4^*}{3} = .066$

* See pp. 122 and 196.

(2) Parallel rail of the same depth and weight, viz: 50 lbs. per yard. Here the thickness of centre rib = .78. Hence,

		Tons
Resistance of Head	$\left\{\begin{array}{l}(2-.78)\times10=12.2\\(5-\frac{1}{2})\times12=54\end{array}\right\}\frac{12.2}{54}=$	0.225
Ditto Rib,	$\frac{4\frac{1}{2}\times5\times.78\times10}{3}=$	58.500
		58.725

And $\frac{4\times58.725}{33}=7.11$ tons, the greatest weight.

Deflection with this weight $\frac{.22}{4.5}=.048$

(3) Parallel rail with bottom web, the depth being still 5 inches, the thickness of the rib .6 of an inch thickness, or breadth of section of lower web 1.32, the weight being 50 lbs.

		Tons
Resistance of Head,	$\left\{\begin{array}{l}(2-.6)\times10=14\\(5-\frac{1}{2})\times12=54\end{array}\right\}\frac{14}{54}=$	0.26
Ditto of Rib,	$\frac{4\frac{1}{2}\times5\times.6\times10}{3}=$	45.00
Lower Web,	$\left\{\begin{array}{l}(5-1\times.72\times10=28.8\\12(5-1)^2+24=216=\text{1st No.}\\216-7=209=\text{2d No.}\end{array}\right.$	
As 216 : 209 : : 28.8 : 27.94		27.94
		73.20

And $\frac{73.20\times4}{33}=8\frac{3}{4}$ tons, the greatest weight.

Deflection with this weight $\frac{.22}{4.5}=.048.$

(4) As another example, let us take a parallel rail of 50 lbs. per yard, depth $4\frac{1}{2}$ inches, thickness of rib $\frac{7}{10}$ths of an inch, and of the bottom web 1.39.

		Tons
Resistance of Head,	$\left\{\begin{array}{l}(2-.7)\times10=13\\(4\frac{1}{2}-\frac{1}{2})\times12=48\end{array}\right\}\frac{13}{48}=$	0.27
Ditto of Rib,	$\frac{4\times4\frac{1}{2}\times.7\times10}{3}=$	42.00
Ditto of Lower Web,	$\left\{\begin{array}{l}3\frac{1}{2}\times(1.39-.7)\times10=24.15\\12(3\frac{1}{2})^2+21=168=\text{1st No.}\\168-6=162=\text{2d No.}\end{array}\right.$	
As 168 : 162 : : 24.15 : 23.28 =		23.28
		65.55

$$\frac{4 \times 65\ 55}{33} = 8 \text{ tons, nearly the greatest weight.}$$

Deflections with this weight $\frac{.22}{4} = 0.55$.

Remarks on the above Results.

It appears from these results, that it is always possible to produce a parallel rail of good practical proportions, which shall be as strong as a fish-bellied rail of the same weight; and this being the case, I am decidedly convinced, after hearing and well weighing every argument that has been advanced in favour of the latter form, that the parallel rail is the best.

First.—Because, although it is not stronger nor stiffer in the middle point than the fish-bellied rail, it is both stronger and stiffer, in a very sensible degree, in every other point.

Second.—The deflection of a parallel rail during the passage of a load, is less every where than in the middle, which is not the case in the fish-bellied rail. The rise and fall of the carriage, therefore, after passing over a support, is more rapid in one case than in the other; and to this, rather than to a want of equable strength throughout, I am disposed to attribute the many failures of fish-bellied rails within a short distance of their point of support. There is, however, or has been hitherto, an actual want of equable strength towards the point of support in rails of this form, which cannot fail to have facilitated these fractures; but which Mr. Stevenson, by a judicious and scientific distribution of the metal, has avoided, and no doubt such fractures would be with his rail less common; but the objection I offer above applies not merely to the fish-bellied rail, but to the truly elliptical form itself, if it were possible to arrive at it.

Thirdly.—The parallel rail is the best, because it enables the engineer to keep the blocks and chairs of the two rails directly opposite to each other, so that the wheels of the carriage shall pass over both supports at the same time,—a point, I believe, not hitherto much attended to, but which is, I conceive, of great importance. There can be no doubt the motion of a locomotive carriage consists of a succession of ascents and descents; and it must be evident how much easier and better the motion would be, to have the opposite wheels both rising and both falling together, than to have one always rising while the other is falling, and the contrary. The difference is similar to that of a vessel keeping her head to the waves, and crossing their direction obliquely. And every one who has never been further than Margate must have experienced this difference.

It may be observed that the waves of the railway, or the deflections of the rails, are very small; but I would observe, also, that the weights and velocities of the carriages are very great, and that it is very desirable every possible cause of momentum should be removed, particularly when it is as easy to do it as not to do it, as is the case with parallel rails, because they can always be cut to determinate lengths, but which cannot be done in the fish-bellied rails, in consequence of the occasional slipping of the bar in the rolls. At all

events, their length cannot be varied at pleasure, which the former will admit of, and which is necessary, in going round sweeps, to preserve the blocks always parallel. For example, in going round a sweep of 800 feet, to keep the supports parallel, the rails of the inner course require to be about an inch shorter than the outer ones, and they are as easily cut into lengths of fourteen feet eleven inches, as of fifteen feet, which is not practicable in the other form.

The above is my decided conviction relative to the longitudinal figure of the rails. I entered upon the inquiry without prejudice; I felt sensible of the honour which the general meeting had done me in confiding the question to my investigation; and I have given to it (after obtaining the requisite data) all the attention necessary to arrive at a certain conclusion.

The following experiments were made on different rails, and the results may be compared with the preceding calculations.

Experiments on the Resistance and Deflection of Railway Bars.

Mr. Stephenson's Fish-bellied Rail, 50 lbs per yard.

Bar No. 1.			Bar No. 2.		
Weights.	Deflections by Index.	Deflections for each ton.	Weights.	Deflections by Index.	Deflections for each ton.
1	.035		1	.014	
2	.045	.010	2	.022	.008
3	.055	.010	3	.030	.008
4	.065	.010	4	.042	.012
5	.071	.006	5	.050	.008
6	.076	.005	6	.062	.012
7	.087	.011	7	.075	.013
7½	.095	.016	8	.085	.010
			9*	.101	.016
			10	* Elasticity injured.	
			11	.300	

Bar No. 3.			Bar No. 4.		
Weights.	Deflections by Index.	Deflections for each ton.	Weights.	Deflections by Index.	Deflections for each ton.
1	.018		1	.045	
2	.025	.007	2	.056	.011
3	.038	.013	3	.065	.009
4	.054	.016	4	.075	.010
5	.062	.008	5	.084	.009
6	.069	.007	6	.095	.011
7	.080	.011	7	.105	.010
8	.094	.014	8	.110	.005
8½	.100	.012	9	.116	.006
9*	.112	.018	10	.125	.009
9½	.118	.018	11	.165	
10	.126	.014			
11	.160	.034			
17	destroyed				

Mean deflection per ton, Bar	No. 1,	.0097
	No. 2,	.0101
	No. 3,	.0110
	No. 4,	.0090
	Mean,	.0100

Table Continued.

Bar No. 5, Fish-bellied. Great depth, 5 inch. Less ditto, $3\frac{3}{4}$. Thickness of rib, 9-10. Head estimated, 2 by 1.			Bar No. 6, Fish-bellied. Great depth, $3\frac{1}{4}$ inch. Less ditto, $2\frac{1}{4}$. Thickness of rib, 7-10. Head estimated, 2 by $\frac{3}{4}$.			Bar No. 7, Fish-bellied. Great depth, 3 inch. Less ditto, 2. Thickness of rib, 6-10. Head estimated, 2 by $\frac{1}{2}$.		
Weight in tons.	Deflec'n by Index.	Deflec'n for each ton.	Weight in tons.	Deflec'n by Index.	Deflec'n for each half ton.	Weight in tons.	Deflec'n by Index.	Deflec'n for each half ton.
1	.030		0.5	.120		0.5	.033	
2	.260		1.0	.140	.020	1.0	.060 Readjs'd	.027
3	.270	.010	1.5	.170	.030	1.5	.062	
4	.290	.020	2.0	.180	.010	2.0	.090	.028
5	.300	.010	2.5	.200	.020	2.5	.120	.030
6	.320	.020	3.0	.230	.030	3.0	.155	.035
7	.335	.015	3.5	.280	.050	3.5	.240	
8	.410	.060	4.0	.420	.140	4.0		
Mean deflection per ton to 7 tons,		.015	Mean deflection per half ton to 3 tons,		.022	Mean deflection per half ton to 2 tons,		.030
Ditto with $7\frac{1}{2}$ tons,		.107	Ditto with 3 tons,		.066	Ditto with 2 tons,		.060

Comparison of the above Results with the Formulæ, page 265, viz:

$$\text{Rib, } \frac{1}{3} hs \,.\, ns \,.\, pq \,.\, t$$

$$\text{Head, } \frac{1}{3} hx \,.\, \overline{nx^2} \frac{nn - pq}{ns} \; t$$

Bar No. 5.

$$\text{Here, } \begin{cases} hs = 5, ns = 4.5, pq = .9, t = 10 \\ hx = 1, nx = .5, nn - pq = 1.1 \end{cases}$$

$$\text{Hence, } \frac{1}{3} \times 5 \times 4.5 \times 9 = 67.5$$

$$\frac{1}{3} \times 1 \times \overline{0.5^2} \times \frac{11}{45} = .20$$

$$\frac{67.7 \times 4}{33} = 8\tfrac{2}{11} \text{ tons}$$

$$\frac{.22}{4.5} \times \frac{4}{3} \times .066, \text{ deflection}$$

Bar No. 6.

Here, $\begin{cases} hs = 3.25, ns = 2.88, pq\ .7, t = 10 \\ hx = .75, nx = .375, nn - pq = 1.3 \end{cases}$

Hence, $\frac{1}{3} \times 3.25 \times 2.88 \times 7 = 21.84$

$$\frac{1}{3} \times .75 \times \overline{.375^2} \times \frac{13}{2.88} = .15$$

$$\overline{21.99} = s$$

$$\frac{4\,s}{33} = 2\tfrac{2}{3} \text{ tons}$$

$$\frac{.22}{2.88} \times \frac{4}{3} = .092, \text{ deflection}$$

Bar No. 7.

Here, $\begin{cases} hs = 3, ns = 2.75, pq = .6, t = 10 \\ hx = .5, nx = .25, nn - pq = 1.4 \end{cases}$

Hence, $\frac{1}{3} \times 3 \times 2.75 \times 6 = 16.50$

$$\frac{1}{3} \times .5 \times \overline{.25^2} \times \frac{14}{275} = .05$$

$$\overline{16.55} =$$

$$\frac{4\,s}{33} = 2.06 \text{ tons}$$

$$\frac{.22}{2.75} \times \frac{4}{3} = .106 \text{ deflection.}$$

Notes and Illustrations.

In order to avoid embarrassing the detail of the experiments with mathematical solutions, I have generally only stated the equations, and their results, in the preceding paper; but as, in its present form, some persons may wish to see the solutions themselves, I shall add here such as involve any difficulty, or which require any illustration.

The first which occurs is the integration of the differential—

$$\frac{x^2\,d\,x}{\frac{d^3}{l^3}(2\,l\,x - x^2)^{\frac{3}{2}}}$$

This may be put under the form,

$$\frac{l^3}{d^3}\int x^2\,(2\,l\,x - x^2)^{\frac{-3}{2}}\,d\,x$$

Or making $2\,l = p$ under the form, $\frac{l^3}{d^3}\int x^{\frac{1}{2}}\,(p - x)^{\frac{-3}{2}}$

Now the part under the integrating sign in a series becomes,

$$\int \frac{x^{\frac{1}{2}}\,d\,x}{p^{\frac{3}{2}}} = \frac{2}{3}\frac{x^{\frac{3}{2}}}{p^{\frac{3}{2}}}, \int \frac{3\,x^{\frac{3}{2}}\,d\,x}{2\,p^{\frac{5}{2}}} = \frac{2}{5}\cdot\frac{3x^{\frac{5}{2}}}{2p^{\frac{5}{2}}}, \int \frac{5\,.\,3\,x^{\frac{5}{2}}\,d\,x}{4\,.\,2\,p^{\frac{7}{2}}} =$$

$$\frac{2}{7}\cdot\frac{5\,.\,3\,x^{\frac{7}{2}}}{4\,.\,2\,p^{\frac{7}{2}}}, \int \frac{7\,.\,5\,.\,3\,x^{\frac{7}{2}}\,d\,x}{6\,.\,4\,.\,2\,p^{\frac{9}{2}}} = \frac{2}{9}\cdot\frac{7\,.\,5.3\,x^{\frac{9}{2}}}{6\,.\,4\,.\,2\,p^{\frac{9}{2}}} \text{ \&c. \&c.}$$

Which, when $x = \frac{1}{2}\,p = l$, may be written,

$$\frac{1}{\sqrt{2}}\left\{ \frac{1}{3}\cdot\frac{1}{1} = .3333, + \frac{1}{5.2}\cdot\frac{3}{2} = .15000, + \frac{1}{7\,.\,2^3}\cdot\frac{5\,.\,3}{4\,.\,2} \right.$$

$$= .06695, + \frac{1}{9\,.\,2^3}\cdot\frac{7\,.\,5\,.\,3}{6\,.\,4\,.\,2} = .03040, \text{ \&c.}$$

This series, after a few terms, may be considered nearly equivalent to a geometrical series, having the ratio $\frac{1}{2}$, and may be summed accordingly. We have thus ultimately for the original expression,

$$\frac{l^3}{d^3} \times \frac{1}{\sqrt{2}} \times .6095, \text{ \&c.} = .41\,\frac{l^3}{d^3}$$ as given in p. 122.

Note to p. 198.

It may be convenient to show the origin of these formulæ, particularly the third, which is not investigated in the preceding pages, except that it has been shown, generally, that if d' denote the depth of the lower fibre below $n\,n$, and its tension be made $= t$, and any variable distance $= x$,

That $\frac{t}{d'}\int x\,d\,x =$ sum of all the tensions to a unit of breadth.

That $\frac{t}{d'}\int x^2\,d\,x =$ sum of all the resistance referred to the axis n.

And $\dfrac{\frac{t}{d'}\int x^2\,d\,x}{\frac{t}{d'}\int x\,d\,x} = \delta'$ distance of centre of tension.

From which it follows, that $\frac{t\delta'}{d'}\int x\,.\,d\,x =$ sum of all the resistances for a unit of breadth, x being taken in its ultimate state.

Now, in the rib, when $x = d'$, $\delta' = \frac{2}{3}\,d$, and $\int x\,d\,x = \frac{1}{2}\,d'^2$, whence the above becomes $\frac{1}{3}\,d'^2\,t$; but to refer this to the centre

of compression c, we have (calling the whole depth d) $\frac{2}{3} d' : \frac{2}{3} d :: \frac{1}{3} d'^2 t : \frac{1}{3} d d' t$; and introducing the breadth $p q$, it becomes $\frac{1}{3} h s . n s . p q . t$.

In the same way, calling the tension at $x = t'$, and the breadth $(n n - p q,)$ we have for the resistance of the head, $\frac{1}{3} h x . n x . (n n - p q) t'$; but the tension at $x = \frac{n x}{n s} t$; therefore, substituting this for t', we have $\frac{1}{3} h x . \overline{n x^2} \frac{(n n - p q)}{n s}$.

For the lower web—

$$\frac{\frac{t}{d'} \int x^2 d x}{\frac{t}{d'} \int x d x} = \delta'$$

Calling $n r = d''$, and x any variable distance below r, it becomes—

$\frac{\int (d'' + x)^2 d x}{\int (d'' + x) d x} = \delta'$; which, when $x = r s$, gives $\delta' = n m + \frac{r s^2}{12 m n}$ and $\frac{t}{d'} \int (d'' + x) d x = \frac{t \delta'}{d'} n m . r s$, whence the resistance referred to $n n$ is, for the breadth $(m m - p q)$ $n m . r s (m m - p q) \frac{t \delta'}{d'}$; and calling $\delta' + n c = \delta''$, it is, when referred to c, $n m . r s (m m - p q) \frac{\delta'' t}{d'}$ which is the formula in question.

In a similar way, the formula for the trapezoidal rail is obtained.

Note to p. 267.

Another equation, on which it may be well to offer a few remarks, is that given in p. 267, viz:

$$\frac{1}{3} \left\{ 5 (5 - x) 9 + \frac{11 . (1 - x)^2}{(5 - x)} \right\} = \frac{8\frac{1}{4} \times 33}{4}$$

This is drawn from the general solution, p. 265, viz: $\frac{1}{3} h s . n s$.

$$p\,q\,.\,t, + \frac{1}{3}\,h\,x\,.\,\overline{n\,x^2}\,.\,\frac{n\,n - p\,q}{n\,s} = s, \text{ and } \frac{4\,s}{l} = w.$$

Taking the result of the experiments, p. 270, at $w = 8\frac{1}{4}$, and the dimensions of that bar as known quantities, every thing in the above is given, except the position of the line $n\,n$. Calling, therefore, $h\,n = x$, and substituting the proper numerical values for the other parts, we have,

$$\frac{1}{3}\,.\,5\,.\,(5 - x)\,.\,9 + \frac{1}{3}\,(1 - x)^2\,.\,\frac{1\,.\,1}{5 - x}\,.\,10 = \frac{33\,.\,8\frac{1}{4}}{4}$$

This reduces first to $45\,(5 - x)^2 + 11\,(1 - x)^2 = 204.18\,(5 - x)$, then to $x^2 - \frac{267.82}{56}x = -\frac{115.1}{56}$, whence the value of $x = .484$.

Here t is taken at ten tons, according to our first mean results; but if, instead of this, we consider it, like x, as an unknown quantity, the equation is, $4.5\,t\,(5 - x)^2 + 1.1\,t\,(1 - x^2) = 204.18\,(5 - x.)$ that is, t and x are dependent quantities, and every change in the value of t produces a corresponding change in the value of x.

If $t = 10.5$, then the equation is, $45\,(5 - x)^2 + 11\,(1 - x)^2 = 194.54\,(5 - x)$; whence $x = .736$.

Again, we may find x quite independently of these considerations, by taking the ratio of the surfaces of tension and compression found in p. 194, viz: 1 : 4, and these into the distances of their respective centres of gravity; or, which is the same, the whole quantity of compression to that of extension, as 1 to 4^2.

Considering this as a general law, and dividing our area accordingly, we have $16\,x^2 = (1 - x)^2 + 3.6\,(3 - x)$, or $16\,x^2 + 5.6\,x = 11.8$; from which we find $x = .720$.

Hence it appears that, whatever method is pursued, the resulting numbers are exceedingly approximative. It has, however, been thought best for the object in view, to derive our final data from that case most resembling the actual subject of inquiry, which is that of railway bars having necessarily an upper table; and in these, t being taken as equal to ten tons in good iron, the neutral line may be considered to divide the area of the upper table into two equal parts, and on these are founded the rules given in p. 267. In other cases it will be better to determine x, as in the last case, and proceed by the general rule.

I know that it has been advanced, on theoretical principles, that at the commencement of strain, the neutral axis is in the centre of gravity of the area of the section, but this consideration does not enter into my investigation. I have not examined the question on theoretical, but on mechanical principles, with a view to one specific object, and have purposely avoided resting any point on mere hypothesis. Every thing is made to depend on experimental results; and, from the uniformity and agreement of these, I have every confidence that the rules founded on them will enable practical men to compute such cases as may occur, with all the precision that can be desired.

As another example, let it be proposed to find the strength and deflection of Mr. Stephenson's rail inverted.

Call the distance of the neutral axis from the top, $hn = x$. (Fig. p. 266.)

Then $.9\,x =$ area of compression, $\frac{1}{2}\,x =$ distance of centre of gravity; $\overline{.45\,x^2} =$ quantity of compression.

Again, $.9\,(5 - x) =$ area of extension of the middle rib; $\frac{1}{2}(5 - x) =$ distance of centre of gravity; $\overline{.45\,(5 - x)^3} =$ quantity of extension of middle rib.

Also, $1.1 =$ area of lower web; $(4.5 - x) =$ distance of centre of gravity; $\overline{1.1}\ \overline{(4.5 - x)} =$ quantity of extension of lower web.

Since as compression to extension, so is $1^2 : 4^2$, we have $7.2\,x^2 = .45\,(5 - x)^2 + 1.1\,(4.5 - x)$ or $x^2 + .829\,x = 2.4$, whence $x = 1.185$, or 1.2, nearly.

Now, by the rules for the middle rib and lower web, (p. 265,) we have $hs = 5$, $ns = 3.8$, $pq = .9$, $t = 10$, and $\frac{1}{3}\,hs\,.\,ns\,.\,pq\,.$

$t =$ . . . . . 57 tons

Also, $nm\ 3.3$, $mm - pq = 1.1$, $d' = 3.8$ $\delta'' = nm + \frac{1}{12\,.\,\overline{mn^2}} + cn = 4.1$

Wherefore, $nm\,.\,rs\,(mm - pq)\frac{\delta''}{d'}\,t =$ 39.1

96.1

$\frac{96.1 \times 4}{33} = 11\tfrac{7}{11}$ tons, the greatest weight.

$\frac{.22}{3.8} \times \frac{4}{3} = .0772$, deflection with that weight.

Whence in the two positions of the rail we have,

$8\tfrac{1}{4} : 11\tfrac{7}{11} :: 1 : 1.4$ ratio of strengths.

$3.8 : 4.5 :: 1 : 1.18$, ratio of ultimate deflections.

$\frac{3.8}{8\frac{1}{4}} : \frac{4.5}{11\frac{7}{11}} :: 1 : .84$, ratio of deflections with equal weights.

¶ *On the Practicability of alloying Iron and Copper.* *By* David Mushet, *Esq.*

In perusing, the other day, Dr. Lardner's third volume on metals,* I met with the following unqualified assertion: "As to alloying cop-

* "Manufactures in Metal, vol. iii. Tin, Lead, Copper, Gold, Silver, and various Alloys," p. 174.

per with iron, the notion not only appears absurd, but unsupported by evidence." As at the present moment Dr. Lardner's publication may be considered a text-book of popular instruction, such a statement might lead to a settled conclusion that to alloy iron and copper is, under all circumstances, impossible. Now the contrary is the fact; and having considered this operation for many years as one which, if happily effected, would materially contribute to the perfection of many of our mechanical contrivances, I hope I shall be excused for entering on the subject somewhat particularly.

In the first place, I see no *prima facie* reason why it should be absurd to expect that iron should unite with copper as well as it does with other metals. Then as to the evidence, I think that most chemical works state the fact as a matter of course, never doubting the practicability of the measure; and in your own Magazine, vol. xlix., I find some experiments on the union of iron with copper; which shows that the subject has not been recently altogether overlooked. The uncertainty which prevails upon the subject arises from the want of accuracy in defining the nature and quality of the iron which has been the subject of the union. Most of the books entirely overlook the various states of iron, and fail to distinguish whether the subject-matter of the experiment was cast iron, or steel, or iron in a state of malleability. The same remark applies to the experiments of Mr. P. N. Johnson as above, who, though he states that he effected an union between iron and copper, yet leaves it doubtful whether the iron was not steel or cast-iron instead of pure or malleable iron. The well-known affinity of iron for carbon precludes the possibility of malleable iron being heated and melted in contact with a large dose of charcoal (as was the case in his experiments,) without its passing into the state of steel, or cast-iron; so that the experiments of Mr. Johnson may be considered as representing, not the union of copper with wrought or malleable iron, but with cast steel or crude iron. Whether or not these were examples of a real chemical alloy, or of a mere mechanical mixture, may be gathered from the following remarks, which are grounded on an extensive series of experiments.

It had for many years appeared a desideratum to me to form castings for shafts, cranks, levers, beams, &c., of a substance that should possess the stiffness of cast, together with the power of tension and strength of wrought iron. It occurred to me that such a discovery would enable the engineer to construct more complete and convenient forms (particularly in the machinery belonging to steam-boats and locomotive engines,) than he is at present able to obtain from the cumbrous forging, turning, and fitting of malleable iron. Such an union of strength I naturally sought for in a mixture of iron and copper; and knowing that the copper ores of this country are principally sulphurets of iron and copper, I commenced my experiments by attempting the joint reduction of the iron and copper. After many failures I so far succeeded as to effect a perfect reduction into malleable matter of the whole contents of any given sulphuret. But upon examining the results, it was found that a very great uncertainty

prevailed as to their strength and quality; and I soon ascertained that I had only succeeded in obtaining a perfect separation from the ore, of the united products of iron and copper. These masses of alloy were arranged and classified as follows :

1st. Ingots of a coppery coloured surface, covered with an exterior blackish shale in cooling resembling iron; breaking with a pale uniform homogeneous fracture, and producing an action more or less on the magnetic needle.

2ndly. Ingots with a gray coppery surface, covered also with an exterior blackish shale in cooling resembling iron, the under surface of a deep red coppery colour. Fracture specular, and beginning to exhibit distinct grains of copper apart from the iron, as if this metal had been saturated with copper. Small hard and bright iron points appeared under the file. These ingots were obedient to the magnet.

3rdly. Ingots with an iron-coloured surface, and coppery tints displayed under a black thin shale. Hard, and filing to a coppery colour, mixed with bright spots. Fracture specular, exhibiting a mixture of iron and copper, in which the former appeared to prevail. Powerfully acted on by the magnet. The lower surface cellular and crystallized, resembling products of fused steel.

Though I have divided these products into three classes only, yet I obtained many intermediate results, the iron present in which I estimated at from 5 to 70 per cent. of the weight of the copper. Beyond 5 or 7 per cent. of iron, no chemical union took place; and as the quantity of iron revived, was in proportion to the charcoal added, so in the same proportion did the separation of the two metals from each other take place. From this it was inferred that malleable iron (*i. e.* iron containing the least possible quantity of charcoal,) would unite and form a proper alloy with copper, but that steel or cast iron would not do so. To try the validity of this reasoning, a new series of experiments was instituted, having for their object the direct union of a portion of copper with iron in various states of cast iron, steel, and malleable iron, the general results of which I will state as briefly as possible, without going into a detail of the various experiments.

Pure malleable iron may be united with copper in any proportion, until it equals, or even exceeds, the weight of the copper; the intensity of the copper colour increases, till the quantities are equal; and the fracture then becomes paler, in proportion as the quantity of iron exceeds that of copper. With 50 per cent. of iron the alloy possesses great strength: its hardness increases with the quantity of iron, but its strength afterwards decreases, and in cutting, it opens before the chisel. The loss of strength in proportion as iron is added, arises, I imagine, from the fibre of the copper being injured by the very high temperature required to fuse the increased quantity of malleable iron. The fracture of the ingots thus obtained is always specular, with a glance arrangement, which betokens a tendency to brittleness.

If steel is fused with copper in the proportion of one-twentieth of the latter to nineteen-twentieths of the former, an ingot resembling, and

crystallized like, cast steel, will be obtained, but useless for forge purposes, and incapable of receiving an edge. Not the slightest symptom of copper, either on the surface or in the fracture, can be perceived, but a very considerable increase of hardness may be observed.

When copper is fused with one-tenth of its weight of bar steel, an ingot is obtained which outwardly resembles the former, with the radiated linear crystallization less distinct. But the fracture, which is hard and brittle, shows, by minute points of copper, the commencement of an indisposition, or inability, to further union, or alloy, between the two metals.

Again, when one-fifth the weight of copper is added of steel, an ingot is obtained which exhibits, when filed, a partially coppery appearance, of a deep red on the lower, and steel bright on the upper surface. The fracture displays a regular grain, which indicates an intimate mixture of copper and iron, apparently of greater strength than in the two former alloys.

When one-third of copper is added to the steel, the former seems to separate, and sinks in considerable quantities, in a soft and malleable state, to the lowest part of the crucible. The fracture exhibits the copper in streaks and knots, indicating a decided want of union*.

White cast-iron, which resembles steel in the quantity of carbon which it contains, affords nearly the same result when fused with similar portions of copper; the alloy, however, possesses less strength, and a greater tendency to disunion when the proportion of copper is increased beyond one-twentieth.

The union of copper with gray cast-iron, if at all practicable, must take place in very minute quantities; for in fusing 5 per cent. of copper along with No. 1, or smooth-faced pig iron, specks of deep red coloured copper were found upon the lower surface of the ingot, and similar traces were discernible in the fracture. With one-tenth the copper became of a deep red colour, separated in leaves, and attached itself to the outside of the cast-iron; and when copper to the extent of one-fifth was tried, a solid bottom of copper was found beneath the cast iron in the bottom of the crucible.

From all I have learnt on this subject, I conclude that copper unites with iron in proportion as the latter is free from carbon; hence it would appear impossible to produce a mixed metal, or alloy of copper and iron, by smelting in a blast furnace, in contact with carbonaceous matter, an ore containing both these metals. It is true that we have ores which, when properly smelted, would afford at the first fusion crude steel, which contains a minimum dose of carbon, and to which might be added as much copper as would chemically unite with it, probably from 5 to 7 per cent. But this quantity, I am afraid, would be too small to form an alloy possessed of the strength

* Steel, both English and Indian (or wootz), was alloyed with copper, in the proportion of two per cent. of the latter, by Messrs. Stodart and Faraday, in their experiments on the Alloys of Steel; but of the value of this alloy, they observe, "we have doubts." They did not attempt to produce it in the large way. See Quart. Journ. of Science, vol. ix. p. 325, 329; and Phil. Mag. vol. lvi. pp. 31, 54; vol. lx. p. 371.—Edit.

and power of resistance necessary to make castings for the purposes already mentioned.

Though I have clearly established, by numerous experiments, the practicability of a perfect union of malleable iron with copper, in every reasonable proportion, yet as this alloy can only be made in a close crucible, it is obviously impossible to employ it for castings of a considerable weight or size. I do not, however, despair of overcoming this difficulty, and of gaining the object I have long had in view, by a different system of alloy, in which copper must necessarily form an essential ingredient. [*Rep. Pat. In.*

¶ *Experiments on the Preservation of Sheet-Iron from Rust, in India. By* JAMES PRINSEP, *Esq.*

The proposed extensive employment of iron steam boats, for the navigation of the Ganges, rendered it a desideratum to ascertain what varnish or composition would best preserve the exterior surface of such vessels from the rapid corrosion to which iron is so peculiarly subject in a hot climate. A series of experiments was undertaken with this view by myself, at the requisition of government; and it may perhaps be useful to record the principal results, in a journal of science.

Two sets of six wrought-iron plates, each measuring 3 feet by 2 feet, were fixed to two iron triangles, the plates being prevented by studs from coming into contact with each other. The same varnishes were applied to both sets, one being intended for entire submersion under water, the other to be only half immerged, in order to [that it might] feel the united influence of air and water.

The following were the coatings applied:

1. Common coal-tar laid on hot, and the plate heated.

2. *Thetsee* varnish of Ava, one coat. This took a very considerable time (two months) to dry, kept first in a cool room, and afterwards in a room heated by furnaces.*

3. Native *Dhúna*, applied to the iron hot, in a thick uneven coat.

4. Best white-lead paint, 3 coats; allowed to dry and harden for nearly three months.

5. Coachmakers' varnish, two coats; dried rapidly.

6. Spirit varnish, several coats; warmed.

7. White wax, melted on the surface.

8. White wash, of pure lime water.

9. The surface of the iron plate cleaned and guarded with an edging of zinc, soldered on.

10. The natural surface of the rolled iron sheets, covered with its usual hardened grey oxide.

* Major Burney states, that three or four days are sufficient for the varnish to dry when laid on wood, (Journal, vol. i. p. 172.) I had not a damp vault in which to expose plate as recommended by that officer, and that may partly account for the delay in drying; but all varnish and paint takes longer to dry on metal than on wood, from its non-absorbent nature.

Many of the foregoing were employed from curiosity only, especially No. 6, the spirit varnish, which had, on many occasions, proved quite ineffectual in preserving the surface of polished iron and steel from rust in the atmosphere of Calcutta.

The two frames were suspended as above described, one under water, the other half immersed, from one of the unused dredging boats, near the Chitpur lock gates, in the circular canal, where they were left undisturbed for three months, during a period of the year when the water of the canal was only slightly salted.

They were then taken up for examination, and presented the following appearances.

No.	Varnish.	Plates under water.	Plates half above water.
1	Tar..........	Perfectly preserved and free from rust.	A few dots of rust between wind and water.
2	Thetsee......	Perfectly uninjured in appearance.	A line of rust at the level of the water.
3	Dhúna........	White and pulverulent; soft and easily rubbed off while wet: rust here and there.	Large cracks from the contraction of the part exposed to the sun, whitened where thick, black where thin; plate preserved above water.
4	Paint.........	Almost wholly disappeared, and blotches of rust on the surface.	Paint uninjured above water mark, and plate preserved, but below water entirely removed.
5	Copal Varnish	Whitened, pulverulent, and soft; but not much oxidated.	In air less whitened, spots of rust breaking out every where,
6	Spirit Varnish	Whitened and very rusty.	Very much corroded.
7	Wax..........	No trace of wax left, and very rusty.	This plate was all under water.
8	Lime.........	Flaky, peeled off, and very much corroded.	In air remains on and acts pretty well.
9	Zinc..........	The clean iron excessively corroded and bad: the zinc also oxidated.	Much more rusty in the air than under water, where a kind of crust was formed.
10	None.........	The natural surface was a little whitened and pretty well preserved.	Rusty on the edges or where it had been scraped; elsewhere little injured.

The superior preservative power of coal-tar to all the substances tried, with the exception perhaps of the thetsee, was evident; the Burmese varnish laboured under the disadvantage of being a single coat, otherwise it would doubtless, from its hardness, its firm adherence, and its inalterability by water, prove fully equal as a lacquer to the coal-tar: the latter has, on the other hand, the advantage of drying and hardening as soon as laid on.

The change effected on the resinous varnishes is produced by an actual chemical combination with the water; the soft pulverulent matter is analagous to the white powder obtained by the addition of water to an alcoholic, or to an acid, solution of resin.

The failure of the zinc guard, which was expected to act as an

electro-positive protector to the iron, may, I think, be attributed to its being adulterated with lead, which being negative with respect to iron, would cause, as was actually the case, a more rapid oxidation of the latter metal: (the impurity of the zinc was afterwards fully proved.)

The wax and the white paint had entirely disappeared from the surface of the metal under water, before the plates were taken up; it is impossible, therefore, to say in what way their removal was effected.

The bituminous (coal tar) coating was finally adopted, and it has been successfully applied to the iron steamer, the Lord William Bentinck, lately launched under Captain Johnson's superintendence.—[*Jour. As. Soc. Ben.* *Rep. Pat. Inv.*

¶ *On Turnouts in Railroads with flexible moveable Rails. By* Thomas Gorton, Civil Engineer.

At a time like this, when Railroads are being rapidly introduced in various parts of the United States, it is believed that any improvement relating to the various parts of their construction will be acceptable to the public.

Up to the present time all turnouts upon railroads, (so far as the writer's knowledge extends,) have been constructed with stiff moveable rails. When these stiff rails are moved round so as to make a communication with the turnout and main line a rectilinear angle of several degrees is formed by the stiff rail and main line, which subjects cars passing through the turnout, to much jar and lateral friction. This friction is so great as to injure both cars and railroad. In a late conversation with Mr. E. Miller, Superintendent of machinery on the Portage railroad, he informed me that they proposed using *flexible* moveable rails for their turnouts. The rail adopted on that road is the parallel edge rail, eighteen feet long, and weighing forty pounds per yard. I understood that the plan of their turnouts was not fully matured, but that it was contemplated to have about three feet of the rail made fast in two heavy chairs, and the other fifteen feet to be sprung into a curved form, when it was desired to pass into the crossing or turnout.

This, at once appeared to me to be a decided improvement, in as much as turnouts might be made on this principle, so that cars might pass through them with the same facility as in the curved parts of the main line. In examining the subject, the first requisite is, that the rail at the moveable end should be deflected so as to leave a sufficient distance between the rail of the main line and the fixed part of the turnout. Then secondly, let the radius of curvature for the turnout be determined. It will be seen that these two requisites determine the length of the moveable rails. These rails may then be laid down in the following manner.

Let about one foot of that part connected with the main line be made fast in a heavy cast-iron chair, by a wedge and by a bolt passing through the chair and rail. The moveable part of the rail may

be supported on chairs; these chairs to rest on cast iron seats having a ledge on one side for the chairs to slide against when the rail is sprung round into the turnout. The seats consequently must be laid down in the curved form which the rail is to assume in the turnout. If it is thought that the chairs on this part of the rail will work out of place, they may be bolted to it, or secured in some other manner by guides on the seats. The two moveable rails of a turnout should then be connected by two or three stiff coupling bars to give them permanence, and preserve the proper distance between them. The rails may then be worked by a vertical lever of a suitable length. This lever with a ball placed upon its top will serve as an index to persons travelling the road, by pointing out the position of the moveable rails, that the cars may be stopped in time if the rails are not right.

The results of some calculations for rails of different lengths, will now be given, together with the length of a turnout for each kind of rail. These calculations are made for a double track of railroad, the distance between the rails of each track being 4.75 feet, and the distance between the inner rails, including the width of each rail, five feet. But as railroads in general, do not differ much from this in outline, the length of a turnout will not be affected much by such difference.

The following table will be understood from the explanation given therein.

Radius of curvature in feet.	Length of moveable rail not including that part in the heavy chair.	Deflection at end of rail in decimals of a foot.	Angle of crossing plates and sine of arc at each end of turnout, in feet.		Feet of straight line in the center of turnout.	Length of turnout in feet.
310.	15 feet.	0.36	7°	37.78	40	115
350.	16	0.36	7°	42.65	35	120
400.	17	0.36	7°	48.75	30	128
410.28	17	0.35	7°	50.00	29.6	129.6
450.	18	0.36	7°	54.84	23	133
500.	19	0.36	7°	60.93	17	139
550.	20	0.36	7°	67.03	11	145

In the above table, fractions of a foot have been omitted in the last two columns, the object being to give sufficient information in a tabular form, from which a comparison of the advantages, and disadvantages may be made for turnouts with moveable rails of different lengths, and arcs of different radii. An angle of 7° has been adopted in this table for the crossing plate. Increasing this angle would shorten the turnout but little. It is hardly necessary to mention that the plan of the turnout proposed here, is that of an inverted curve, with a piece of straight line in the centre.

It is believed that a turnout of from 400 to 500 feet radius, with flexible moveable rails, will be found to answer a much better purpose than those in use at the present time. Several important railroads have curves as abrupt as this. On the Baltimore and Ohio railroad there are two sharp curves, one of 337, and the other of only 318 feet radius. [*Silliman's Jour.*

¶ *On the Fusion and Appearance of Refined and Unrefined Copper. By* David Mushet, Esq.

The following are "a few extracts from experiments made some years ago, with a view to ascertain what effect would be produced upon the strength and malleability of copper, by retaining, to a certain extent, the alloy (chiefly tin), which is found in rough copper, and which it is the purpose of the refinery to discharge. In the first place, I obtained a quantity of shotted rough copper, made from the furnace in which the copper, though alloyed with other matters, first appears in its metalic form. These shots were light and flaky, hard when struck, but at the same time partially ductile. A quantity of pure shotted copper, made from the refinery, and having the form of flattened spheroids, and much denser than the other, was procured at the same time for the purpose of these experiments

Exp. No. 1. A quantity of rough copper was fused in a black-lead crucible with nearly an equal bulk of charcoal, and poured into an open iron mould. The bar or ingot thus made, was $\frac{3}{4}$ of an inch thick, and when cold and broken, was found to have crystallized in converging striæ perpendicular to the upper and lower surfaces, and declining towards the outer edges of the bar. The grain was of a pale colour inclining to gray, indicating the presence of tin.

Exp. No. 2. Three bars procured in this way were melted together in a black-lead crucible without charcoal, and poured into a mould just at the moment when the melted copper put on a creamy appearance. When cold, the surface of the ingot thus obtained, was less coppery-metallic than the surface of the ingot in the first experiment, where charcoal was used; from which it may be inferred that, owing to the absence of charcoal, a certain degree of refinement had taken place. The fracture possessed more of the red grain of good copper; the striæ were less distinct and less crystalline; and the surface instead of being convex, as in the first experiment, was concave.

Exp. No. 3. Some of the pure shotted copper was fused in a black-lead crucible with an equal bulk of charcoal, and the resulting ingot presented a more clean and perfect mass of copper than the ingots obtained in Experiments No. 1 and No. 2. The fracture presented a series of brilliant striæ arranged from surface to surface, breaking off easily in the direction of the perpendicular fibre, a structure which seems wholly incompatible with extension or malleability.

Exp. No. 4. Some of the same pure copper melted similarly, but not poured into the mould until it had nearly lost its fluidity, formed an ingot less striated or crystallized than any of the former, with more of that minute deep orange-coloured grain which is peculiar to pure and malleable copper. From the results of this experiment, and of No. 2, it would seem that when copper is poured into the mould at as low a temperature as is consistent with perfect fluidity, the fracture is less crystallized, and the colour approximates to that ruby grain which indicates the malleable state of copper.

Four bars, one from each of the foregoing experiments, were imbedded in burnt lime, shut from the access of air, and exposed in crucibles to the same temperature. The pure copper bars (Nos. 3

and 4) were on the surface considerably oxidated, but those made from the rough copper (Nos. 1 and 2) were entirely free from oxide; and from this it may be inferred that the alloy (principally tin) which still remained in the copper, prevented waste or oxidation. The bar from Experiment No. 1, was not cut, but that from Experiment No. 2, retained about the same quantity of grained striæ as before the cementation; though, compared with a fracture of the same copper that had not been cemented, the grain was redder, the colour more brilliant, and the metal more ductile. The bar from Experiment No. 3, was covered with a thin coating of crystallized oxide exceedingly soft; the striæ were more enlarged and adhesive, so that the copper, in cutting, tore out in flakes, which separately were soft and ductile. The bar from No. 4, when examined and compared with an uncemented one, was more open in the grain, redder, and more brilliant; but the quantity of depth of grain was nowise altered, although the metal cut softer, and was covered with a thin crust of shining oxide. From these details it may be presumed, that cementation opens the grain, renders the bar less dense, but does not change the peculiar form of the arrangement. In each case the copper after cementation was softer, a change which seems favourable to rolling cold. The impure or rough copper appears to be alloyed with another metal (no doubt tin,) which prevents that oxidation which pure copper in the same circumstances would undergo.

Besides the above, several bars were made from the rough copper by a slower fusion, and with a longer exposure to the charcoal, and it was observable, that the longer the exposure, and the slower the fusion, the more yellow and refined was the copper in the bar.

Some of the bars produced in the course of these experiments were attempted to be rolled; but the success was various. Of those made from the pure copper, some rolled better and others worse than any made from the rough copper: one or two bars of the latter were equally malleable with the former; but none rolled well either hot or cold. In those bars in which the striated arrangement was most perfect, the capacity for rolling was least, and those in which the minute granular fracture prevailed, generally rolled the best. It certainly does appear that this tendency to crystallize, so destructive to malleability, is peculiar to English copper made from the crucible. There are occasions, no doubt, when the proper temperature being hit upon, the bar would roll; but these occasions are so rare and uncertain that English copper made in this manner could not be relied upon in the manipulations connected with manufactures. There is no question that the arts in this country suffer from the peculiarity of English copper. For, in consequence of it the malleabilization of that metal is necessarily confined to the original process of refining practised on the great scale by the copper smelters. It is very different with Swedish and Russian copper, which I have seen melted in considerable quantities in large crucibles, cast into cakes or thick sheets, and afterwards rolled into boiler-plate and thin sheet-copper. This subject requires and deserves a scrutinous examination, with a view to discover the cause of the uniform tendency of English copper to crystallize; and that cause may, perhaps, be found in the process

employed in this country for the smelting of copper ores, a process which, however economical and well calculated to overcome quantity, has never yet produced pure copper. [*Lon. Edin Phil. Mag.*

¶ *On the Preparation of Bistre.*

This colour, used by painters in the manner of Indian ink, is prepared from wood soot, in the following manner. Make choice of those pieces of soot which are the hardest, and adhere most to the chimney; pulverize them, and pass the powder through a fine sieve. Throw this powder into pure water, stir it from time to time with a glass spatula, leave it at rest, and, finally, pour off the water. This water dissolves all the foreign salts. We may hasten their solution by placing the glazed earthen vessel containing the solution over a fire. When other water, on being added, will no longer dissolve any salt, and it remains of the same degree of specific gravity as before it was employed, we put the sediment into a tall narrow vessel, which is to be filled with water, and agitate it with the spatula; it is then left at rest for a few minutes, in order that the coarser parts may settle. The liquid is then to be poured into another similar vessel, and the coarser parts remaining at the bottom of the former one may be thrown away as useless.

This operation may be repeated two or three times, and the oftener, the finer will be the bistre. It must be finally left at rest for some time, and the clear water poured off from the sediment, which is to be incorporated with gum water, and it is fit for use. [*Dict. Tech.*

List of American Patents which issued in August, 1835.

	August
441. *India rubber, spreading, &c.*—William Atkinson, New York,	15
442. *Saw set.*—Theodore Taylor, Port Deposit, Md.	15
443. *Churn.*—Joseph Turner, Portland, Maine,	15
444. *Corn sheller.*—Joseph Turner, Portland, Maine,	15
445. *Candles, making.*—Willard Morey, Charlestown, Mass.	15
446. *Cartouche Box.*—Robert Dingee, city of New York,	15
447. *Grass seeds, hulling.*—Samuel Gould, Jr., New Portland, Maine,	15
448. *Cooking stoves.*—Solomon Dickinson, Richmond, Indiana,	15
449. *Tanning.*—Henry C. Locker, Lancaster, Pennsylvania,	15
450. *Cutting and press machine.*—Benjamin Morris, Oxford, N. Y.	15
451. *Shoe pegs, splitting.*—Mark Wilder, Peterborough, N. Y.	15
452. *Rotary pump.*—David M. Walker, Cavendish, Vermont,	15
453. *Potash, making.*—Elijah Williams, Harbor Creek, Pa.	15
454. *Ship building.*—Charles Olcott, Medina, Ohio,	15
455. *Washing and bleaching machine.*—Calvin H. Farnham, Norwich, Conn.	15
456. *Shingle sawing machine.*—David B. Moore, Stafford county, N. H.	15
457. *Brick machine.*—George W. Gilbert, Pittsburg, Penn.	15
458. *Bricks for roofs, &c.*—James Parker, Gardiner, Maine,	15
459. *Press for cotton, &c.*—E. Macomber & L. L. Macomber, Gardiner, Me.	15
460. *Evaporating and condensing solvents.*—J. Golding, Boston, and R. Brackett, Lynn, Massachusetts, ...	15
461. *Stove for heating irons.*—John Lewis, Derby, Conn.	17
462. *Water lime cement for roads.*—Joseph Robey, Jr., Albany, N. Y.	17
463. *Churn.*—Caleb Angerine, city of New York,	17

		August
464.	*Harpoon.*—Caleb Angerine, city of Boston,	17
465.	*Wire door spring.*—John Codman, city of Boston,	17
466.	*Heat, saving, in steam boilers.*—Tunis V. Leroy, Buffalo, New York,	17
467.	*Power loom.*—Amasa Stone, Providence county, Rhode Island,	17
468.	*Gates for canal locks.*—David Wilkinson, Cahoes, New York,	17
469.	*Silk, unwinding and spooling.*—Gamaliel Gay, Poughkeepsie, N. Y.	17
470.	*Mowing machine.*—John P. Chandler, Wilton, Maine,	17
471.	*Woollens, printing and dying.*—William Duncan, Belville, N. J.	17
472.	*Wheel, spiral band.*—Samuel G. Walley, Chester county, Penn.	17
473.	*Anthracite, breaking.*—Jonathan S. Hubbell, New York,	17
474.	*Grain, grinding and chopping.*—Pierson Cope, Fayette county, Pa.	17
475.	*Pocket pistol.*—Victor M. Wallace, West Topham, Vt.	17
476.	*Cooking stove.*—Ezekiel Gore, Jr., Guilford, Vermont,	17
477.	*Tide power.*—Henry B. Furnald, Portland, Maine,	17
478.	*Saddletree.*—John M. Bouton, Newark, New Jersey,	17
479.	*Plummer blocks, &c.*—Matthias W. Baldwin, Philadelphia,	17
480.	*Oil of Harze.*—Preswick & Fisher, New York,	17
481.	*Composition of Plaster, &c.*—Julius Hatch, Great Bend, Penn.	17
482.	*Brushes.*—William Steel, New York,	17
483.	*Screw wrench.*—Solyman Merrick, Springfield, Mass.	17
484.	*Vapour bath.*—Peirce P. N. D. Alrigny, New York,	17
485.	*Sawmill saw.*—Levi Fisk, Schroon, Essex county, New York,	17
486.	*Churn.*—Clifton C. Stearns, Bucksport, Maine,	17
487.	*Pendulum lever.*—Asahel Munger, Oberlin, Ohio,	17
488.	*Planing machine.*—Fisher Stedman, Aquackanackin, New York,	17
489.	*Chairs, making.*—Eli F. Benjamin, Utica, New York,	17
490.	*Rotary steam and air engine.*—George Cameron, Washington, D. C.	17
491.	*Hemp and flax, dressing.*—John Goulding, Boston, Mass.	17
492.	*Horse power.*—Benjamin Wales, Hallowell, Maine,	17
493.	*Cholera medicine.*—Robert S. Barnard, Norfolk, Virginia,	17
494.	*Cooking stove.*—Edward N. Kent, Portland, Maine,	17
495.	*Metallic roofing.*—Charles Bonnycastle, Charlottesville, Va.	17
496.	*Grain and flour, drying, &c.*—James Lee, Maysville, Kentucky,	17
497.	*Rigging ropes.*—James Fales, New Bedford, Mass.	20
498.	*Grist mill.*—Adna L. Norcross, Hallowell, Maine,	20
499.	*Spinning hemp, &c.*—Andrew Caldwell, Lexington, Kentucky,	20
500.	*Forcing pump.*—William Douglass, Middletown, Conn.	20
501.	*Stove backs and linings.*—Joseph Putnam, Salem, Massachusetts,	20
502.	*Granaries.*—John Harmony, Chambersburg, Penn.	20
503.	*Cultivator and harrow.*—Peter Clark, Aurora, New York,	20
504.	*Bricks, pressing, &c.*—Nathan Reed, Waldo, Maine,	20
505.	*Steam boilers.*—Hunsicker and Krauss, Northampton, Penn.	20
506.	*Washing machine.*—David Warren, Winthrop, Maine,	27
507.	*Washing machine.*—W. &. J. Collins, Norwich, Conn.	27
508.	*Hydraulic cement.*—Parker, Clowes, and Garfield, New York,	27
509.	*Cooking ranges.*—Thomas B. Smith, New York,	27
510.	*Arresting sparks.*—Alfred C. Jones, Portsmouth, Virginia,	27
511.	*Turpentine, &c. distilling.*—Isaiah Jennings, New York,	27
512.	*Neck stocks.*—Thomas Goodrum, New York,	27
513.	*Mill gearing.*—Olearaius R. Colman, Barry's Bridge, Va.	27
514.	*Thrashing machine.*—William Matthewes, Charleston, S. C.	27
515.	*Thrashing machine.*—John Gearhart, Rush township, Northumberland county, Pennsylvania, ...	27
516.	*Mould-boards.*—William Hoth, Buffaloe, New York,	27
517.	*Fire engine.*—Thomas Odiorne, Portsmouth, New Hampshire,	27
518.	*Pump.*—Thomas Odiorne, Portsmouth, New Hampshire,	27
519.	*Grates.*—Ebenezer B. Strong, Buffalo, New York,	27
520.	*Grooving planes.*—James Herman, Fairfield, Ohio,	27

CELESTIAL PHENOMENA, FOR NOVEMBER, 1835.
Calculated by S. C. Walker.

Day.	H'r.	Min.						
4	8	24	Im.	v Arietis,	,6,	N.	51°	V. 0°
4	8	48	Em.				21°	336°
6	13	19	Im.	51 Tauri,	,7,		97°	104°
6	14	47	Em.				303°	347°
6	14	22	Im.	56 Tauri,	,6,7,		118°	154°
6	15	47	Em.				282°	334°
6	18	17	Im.	x^2 Tauri,	,6,7,		152°	208°
6	18	56	Em.				224°	277°
7	0	28	1st ex. contact of Mercury and Sun,				322°	340°
7	0	30	1st internal " " "					
7	3	4	N. App.					
9	16	16	Im.	7^2 Geminorum,	,6,7,		47°	77°
9	17	30	Em.				303°	356

Meteorological Observations for July, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	54°	71°	29.80	29.80	W.	Brisk.		Clear day.
	2	55	71	.80	.75	W.	do.		Clear day.
☾	3	63	79	.70	.70	W.	do.		Lightly cloudy—clear.
	4	64	84	.70	.70	W.	do.		Clear day.
	5	66	82	.74	75	W.	do.		Clear—lightly cloudy.
	6	65	75	.80	.85	NW.	Moderate.	0.09	Rain—lightly cloudy.
	7	65	83	.90	.85	SW.	Brisk.		Fog—clear.
	8	72	83	.80	.80	W.	Moderate.		Cloudy—flying clouds.
	9	63	75	.85	.85	E.	do.	0.05	Cloudy—rain.
☺	10	65	75	.80	.85	SW. W.	Brisk.		Cloudy—flying clouds.
	11	60	78	30.00	30.00	W.	Moderate.		Clear—flying clouds.
	12	66	80	.00	29.85	SE. S.	do.	0.05	Drizzle—flying clouds.
	13	69	85	29.85	.85	W.	Brisk.		Clear day.
	14	73	86	.80	.80	W.	do.	0.05	Lightly cloudy—shower.
	15	70	77	1.80	.80	SW.	Moderate.	1.85	Cloudy—heavy showers.
	16	62	73	.65	.75	W.	do.		Clear—flying clouds.
☽	17	62	78	.85	.80	NW.	do.		Clear day.
	18	63	83	.80	.83	W.	do.		Cloudy—clear.
	19	55	82	.90	.90	SW.	do.		Lightly cloudy.
	20	67	76	.85	.85	SW.	do.	0.22	Lightly cloudy—thunder showers.
	21	67	78	.95	30.00	W.	do.	0.04	Cloudy—showers.
	22	62	80	30.05	.10	NW.	do.		Clear day.
	23	62	83	.10	.00	W.	do.		Clear day.
	24	63	83	29.95	29.93	W.	do.		Clear day.
⊗	25	69	85	.85	.85	SW.	do.		Cloudy—clear.
	26	76	83	.80	.80	SE.	do.		Cloudy—lightly cloudy.
	27	65	72	30.05	30.05	SE.	do.		Cloudy—flying clouds.
	28	62	66	00	29.93	SE.	do.	0.78	Rainy day.
	29	66	77	29.86	.86	SE. S.	do.		Drizzle—flying clouds—rain in n't.
	30	65	80	.76	.76	W.	do.	0.68	Clear day.
	31	68	84	.66	.66	W.	do.		Clear day.
	Mean	61.98	79.94	29.85	29.84			3.81	

	Thermometer.	Barometer.
Maximum height during the month,	86. on 14th.	30.10 on 22d & 23d.
Minimum do.	54. on 1st.	29.60 on 1st
Mean do.	72.46	29.84

JOURNAL

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MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

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AMERICAN AND OTHER PATENTED INVENTIONS.

NOVEMBER, 1835.

Inquiry in relation to the alleged influence of Colour on the radiation of non-luminous heat. By A. D. Bache, *Prof. of Nat. Philos. and Chem., University of Pennsylvania.*

In the following essay I propose to submit a few remarks upon a paper by Doct. Stark of Edinburgh, first published in the Transactions of the Royal Society of London, for 1833, together with an experimental inquiry into the alleged influence of colour on the radiation and absorption of *non-luminous* heat.

The experiments were commenced soon after the paper referred to, reached this country, and in them was adopted what seemed to me the less exceptionable of two methods used by Doctor Stark, which actually bear upon the question of the radiation of non-luminous heat. It was my intention to examine the matter more fully than had been done by Dr. Stark, and to procure a more satisfactory induction by experimenting on a considerable variety of substances. In this I had the kind assistance of my colleague, Prof. Courtenay.

While these experiments were in progress, the remarks of the Rev. Professor Powell, of Oxford, on the paper of Doctor Stark, appeared in the Edinburgh New Philosophical Journal. They confirmed me entirely in the view of the inapplicability of most of the experiments made by Doct. Stark, to the determination of the question of the influence of colour on the radiation or the absorption of heat.— Of this class were the absorption of heat, *radiant* heat being under-

stood, as tested by the inverse of Count Rumford's method for comparing the conducting powers of substances used for clothing; also, as tested by the effect of the heat from the *flame* of an argand gas burner, thrown by a mirror upon the bulb of an air thermometer, which was variously coated. Of the same class were the experiments on radiation, as tested by the method used by Count Rumford, as above referred to; the enveloping materials of the inner thermometer being wools of different colours, and coloured wheaten paste.

Not included in this class are the methods of ascertaining the rate of cooling of a thermometer of which the bulb was coated with different pigments, and of a glass globe filled with warm water and variously coated. I gave the preference to a modification of this latter method from the greater extent of radiating surface which may, without inconvenience, be commanded by it. The glass globe used by Dr. Stark, was one inch and a quarter in diameter; it was coated at different times with Prussian blue, red lead, and white lead, and in a room at 50° Fah., the fall, from 120° through 25 degrees, was in seventeen minutes, eighteen minutes and nineteen minutes.

I am constrained to differ from Professor Powell in his remarks upon the method just referred to, and, with great deference to so high authority would state why I consider them inconclusive. Professor Powell deems it necessary, or at least highly important to the determination of the question, that the radiating coatings of the globe should be equalized in respect to thickness, conducting power, density, &c., and refers to the experiments of Prof. Leslie, in which equal quantities of different radiating substances were dissolved and spread upon a surface, for comparison. That equal thicknesses of substances possessing different radiating powers should be compared together, seems to me to be disproved by the law established by Sir John Leslie's own experiments, namely, that radiation takes place not only from the surface, but in a thickness which is appreciable in good radiators. Thus when different coatings of jelly were applied, in succession, upon one of the sides of the cube in Prof. Leslie's experiments, the radiation increased with the thickness, up to a certain point. The effect of conducting power appears by this same experiment to be so small that an increase of the thickness in the bad conductor was actually more than compensated for by the increased radiating power. The influence of density on conducting power is well known, but the effect of either as controlling the radiating power of a substance, or as modifying it, is, I apprehend, yet to be appreciated. If these views be correct, and they are, I believe, founded upon the authorities so ably illustrated by Professor Powell in his report on radiant heat, to the British Association, the radiating powers of substances would not be rightly compared by equalizing their thicknesses upon a given surface, nor by equalizing their weights; but by ascertaining, for each substance, that thickness beyond which radiation does not take place. This will be placed in a clearer point of view in the sequel.

I do not however, consider the question at issue as the less difficult to determine, "no substance can be made to assume different

colours without at the same time changing its internal structure,"* and I believe with Professor Powell that "a very extensive induction is perhaps the only means open to us of ascertaining this, (the circumstances and properties wherein the coatings differ) considering how totally ignorant we are of the peculiarities on which their colour depends."

This *very* extensive induction I do not pretend to have made, but I think to have multiplied our experiments so much beyond the number made by Dr. Stark, as to be able to show that the supposed influence of colour on the absorption and radiation of heat remains yet to be demonstrated, and thus to prevent the admission as proved of what is more than doubtful.

The principal object was to select a considerable variety of pigments of the same colour differing chemically, and of different colours chemically allied, and, as subsidiary, to ascertain the effect of changes of colour produced by chemical means on different substances, and the effect of the material used to apply the pigment to the radiating body.

Several tin cylinders were procured, two inches high, and 1½ in diameter, closed at the bottom, and having fitted to the top a slightly conical tube, to receive a perforated cork, through which to pass the stem of a thermometer. One of these vessels having been selected was coated in successive layers with a pigment. Water which was boiling in a porcelain capsule was then poured into the cylinder, which was suspended by means of two lateral hooks to cords attached to the canopy covering the lecture table. A thermometer introduced through a cork had its bulb nearly in the middle of the axis of the cylinder, and the thermometer by displacing part of the water assured that the quantity contained was the same in each case. A temperature was selected for beginning the experiments, sufficiently below that which the introduction of boiling water produced, to permit the rate of cooling to have become uniform, and one for ending which was high enough to prevent uncertainty from the slowness of the fall of temperature. The instant of the arrival of the mercurial column at any degree on the scale, and of its leaving the same, was noted, and a mean taken for the time of being at that temperature; a precaution which though superfluous in such experiments as these, will, I am persuaded, be found of importance where minute accuracy is desired in investigating the motion of heat. One of us observed the thermometer, the other noted the time by a pocket chronometer.

The time of cooling of the cylinder coated with colouring matter having been ascertained, an additional layer of the same substance was put upon it and the cooling again observed. The time of cooling diminished, of course, until that thickness was attained beneath which no radiation takes place, the time then slowly increased with each additional coat, the conducting power entering as an appreciable element into the rate of cooling. To show the decided nature of the

* Prof. Leslie's Essay on Heat.

results, I subjoin an account of one series towards the beginning of our experiments, when a want of experience rendered us cautious in applying the successive coatings, lest we should pass the thickness of determinate radiation. The necessity for thus feeling our way, rendered the labour of the experiments very considerable.

Cylinder coated with Prussian blue:

Time of cooling from 180° to 140° Fah.

1.	Thick coating,	. .	1011½ seconds.
2.	ditto. added,	.	965
3.	Additional coat,	. .	910¾
4.	do. do.	.	829½
5.	do. do.	. .	805
6.	do. do.	. .	842

Another series, in a further advanced stage of our experiments is subjoined:

Cylinder coated with Litmus blue.

Time of cooling from 180 to 140° Fah.

1.	First thick coating,	.	985 seconds.
2.	Additional coat,	. .	855
3.	do. do.	.	827½
4.	do. do.	. .	834½

Besides the necessity of making several experiments to obtain a single result, it sometimes occurred that particular results required to be repeated for verification, when apparent discrepancies occurred; this was done to ascertain if they were real or not.

As it was obvious that the experiments must necessarily extend through a considerable time, during which the circumstances attending the cooling of the cylinders could not be expected to remain uniform, a standard for comparison was provided, in a cylinder of which the coating was not changed, and which was observed in regular turn with the other cylinders. At first a vessel without coating was used for this purpose, but as it was found liable to tarnish, it was substituted by a cylinder having a coating of aurum musivum, which was one of the smoothest and most uniform of the coloured substances used.—The numbers obtained on the different days from a mean of the trials made of the cooling of the standard cylinder, were applied to compare the results of one day with those of another. This assumes that the times of cooling of the different vessels would be affected proportionately by a given change in the circumstances of the experiment. This inability to preserve the circumstances constant is the real objection to this method, and one which most affects the certainty of the results.*

The following example shows the application of this method. The observed times of cooling of the standard cylinder, from 180 to 140° in two experiments on the 31st of October, were 969½ and 968½ seconds, mean 969. Three experiments on the first of November, gave 898, 892, and 893½ seconds, mean 894½.

* If the circumstances could be retained the same, three observations of the temperature at equal known intervals, would give a numerical expression for the radiating power of the coating.

Cylinder, number four, coated with cochineal (crimson) gave for the time of cooling from 180 to 140° on the 1st of November, 848½. To compare this with a result obtained with the same cylinder on the 31st of October we have 894½ : 969 : : 848½ : x, the equivalent number for October 31st, 916.3 seconds.

The results obtained with the same cylinder on different occasions of experiment, having been thus rendered comparable, the comparison of experiments with different cylinders, was effected by determining the time of cooling with the same coating upon different cylinders. Thus, numbers one and two having been coated with carbonate of lead, and their times of cooling through forty degrees having been ascertained, all the results with the various other coatings applied to these cylinders were comparable.

The numbers thus obtained will not be strictly proportional to the radiating power of the substance used, for the whole surface of the cylinders, including the ends, was not coated, and the contact of the air, and its consequent circulation exert a most important influence on the rate of cooling. This latter element has been shown by the experiments of Petit and Dulong, to be independent of the nature of the surface, and as the amount of uncoated surface remains constant, the greater effect of radiation will appear by the more rapid rate of cooling, and the less by the less rapid rate.

I proceed now to examine the degree of approximation which may be expected from the results of the experiments.

First, a comparison of different observations on the same day under the same circumstances of the cylinders, and nearly or quite the same as to the temperature of the room, will show how far accuracy is possible under the most favourable suppositions. The following table presents the results of this kind obtained during the entire series of experiments, with the ratios of the times of cooling:

Nature of Coating. Cylinder No. 3.	Time in sec's.	Ratio.	Nature of Coating. Cylinder No. 1.	Time in sec's.	Ratio.
No coating.	1281¾	1.000	Sulphuret of Antimony.	849½	1.000
	1300	1.014		972¾	1.145
Chalk.	909¼	1.000	do. additional.	871½	1.000
	939¼	1.034	Coating on another occ'n.	878½	1.008
Prussian blue.	909½	1.000	Red lead.	886½	1.000
	932½	1.025		894½	1.009
Litmus blue.	920½	1.000	do. blackened	911½	1.000
	956	1.038	by sulphuretted hydrogen	924½	1.014

Cylinder No. 5.			Cylinder No. 4.		
Aurum Musivum.	892	1.000	Gamboge.	932	1.000
	893½	1.001		942½	1.011
	898	1.007			
			Chromate of lead.	938½	1.000
do. on another occasion.	937½	1.000		954½	1.017
	959	1.023			
			Vermilion.	845	1.000
do.	943½	1.000		850	1.006
	957	1.014			
			Sulphate of Baryta.	740½	1.000
do.	818	1 000		778	1.051
	820½	1.003			
			Cylinder No. 1.		
do.	850	1.000			
	860	1.012	No coating.	1396½	1.000
	897	1.055		1425½	1.020
				1445½	1.035
do.	851	1.000			
	872½	1.025	do. another occasion.	1313½	1.000
				1315½	1.002
			do.	1303	1.000
				1320	1.013

In the foregoing table, ten of the ratios are about 1.01 to 1, six 1.02 to 1, three 1.03 to 1, one 1.04 to 1, and two 1.05 to 1: it is therefore fair to infer that the single ratio of 1.14 to 1 results from an error of record or observation, and the table fully shows, that *under the same circumstances the results could readily be reproduced within about two per cent.*

Second. The correction for the altered circumstances of temperature of the room, &c., may be tested by comparing the experiments made with different cylinders having the same coatings on different days. In the annexed table is given the various results of this kind furnished throughout the series of experiments. The date is given in the left hand column, and applies to all the results on the same horizontal line with it. A comparison of the numbers in the columns marked ratio, and on the same horizontal lines will show how far the same reduction to a standard would have been given by different cylinders: in other words, how far the influence of currents of air, local temperature, and radiation from or to adjacent bodies might have interfered with the particular results.

Date.	No. cylinder.	Nature of Coating.	Reduced time of cooling,	Ratio.	No. cylinder.	Nature of coating.	Reduced time of cooling.	Ratio.	No. cylinder.	Nature of coating.	Reduced time of cooling.	Ratio.
Oct. 21	II.	Not coated.	1406	1.00	III.	Prussian blue.	914	1.00				
24			1422½	1.00			953¼	1.04				
24		Do.	1422½	1.06		do.	953¼	1.05				
25			1314½	1.00			910¾	1.00				
28	I.	Ammoniacal sulphate of copper,	853½	1.01	V.	No coating.	1342	1.02	V.	Litmus blue.		
29			849½	1.00			1311½	1.00			855	1.00
31			862	1.01			1359½	1.04			827	0.97
31	II.	Ammoniacal sulphate of copper,	930	1.13	IV.	Cochineal.	877½	1.03	V.	Aurum Musivum.	968¼	1.08
Nov. 1		(not the same as above.)	826½	1.00			848½	1.00			894½	1.00
1	II.	Ammoniacal Sulphate of copper,	808½	1.00	IV.	Chromate of lead.	907	1.00	V.	Aurum Musivum.	894½	1.00
6		(not the same as above,)	831½	1.03			944½	1.04			948½	1.06
6	I.	Red lead.	890½	1.00	IV.	Alkanet.	980½	1.00	V.	Aurum Musivum.	948¼	1.00
11			912¼	1.02			926¾	0.95			950¼	1.00
15	V.	Aurum Musicum.	865½	1.06	VI.	Black lead.	870	1.09				
17			819¼	1.00			799	1.00				
17	III.	India Ink.	788½	1.00	V.	Aurum Musivum.	819½	1.00				
18			836½	1.06			869	1.06				
20		India Ink.	834	1.00	V.		816	1.00				
21			890	1.07			861¼	1.06				

Of the ratios thus brought into comparison it will be found that in one case the results are identical, in four others that they differ one per cent., in two others two per cent., in four others three, in one

four, in three five, in two seven, and in one ten per cent: omitting this latter the accordance is much less satisfactory than was shown by the former table, and the average amount of error is nearly four per cent.

Having now shown the probable limits of accuracy in the experiments, I proceed to compare together the reduced times of cooling of the same cylinders with different coatings. In the table will be given the observed time of cooling through forty degrees, and the time of cooling of the standard, from whence the reduced times are deduced. As the colours of the substances were not in all cases what would be expected, the colour is designated in a separate column.

Cylinder No. 1, variously coated.

Nature of Coating.	Colour.	Date.	Observed time of cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec'ds.	
Carbonate of lead.	White.	Oct. 24	864	1014	864	Smooth.
Vermilion.	Red.	25	806	937	872	Smooth, with minute cracks.
Golden Sulphuret of Antimony.	Brown, nearly black.	31	868.5	969	909	Rough, peels easily
Red Oxide of lead.	Orange.	Nov 6	890.5	948.2	952	Smooth.
do. additional coat		11	932.7	950.2	995	For comparison with following.
Do. blackened by hydro sulphate of potassa.	Brown.		917.8	"	966	Red shows thro'.
Plumbago.	Black.	17	787	819.2	974	Uniform, but not glossy.
Gamboge.	Olive.	20	808.7	816.	1005	Smooth, but in streaks.

The radiating power being greater, as the time of cooling is less, we have the order of radiating power of the different coloured substances, as follows: white, red, brown, orange, black, green. Omitting in this enumeration the blackened surface of the red oxide of lead, which had passed in thickness the maximum radiating thickness, and is only comparable with the result which precedes it. The change of colour effected by changing the surface to sulphuret of lead, (black or rather brown) increases the radiating power in the ratio of 1.03 to 1, which is within the average of error.

The following results given in order of time, and reduced by the standard, were obtained with cylinder No. 2.

Nature of coating.	Colour.	Date.	Observed time of Cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec's	
Ammoniacal sulphate of copper.	Blueish green.	Nov. 6.	808.5	948.2	856	Streaked and peels off rough.
Indigo.	Blue.	11	928.	950.2	990	Very smooth.
Carbonate of lead.	White.	14	883.2	956.	937	Smooth.
do.		15	910	856.5	982	For comparison with following.
do. blackened by hydro sulphate of potassa.	Black.	15	874		944	
Per oxide of Manganese.	Darkbrown	18	747	869	872	Uniform but not smooth.

The variety of colour is here small; the radiating powers rank, blueish green, dark brown, white, blue; omitting the second experiment with the carbonate of lead which is only comparable with the one in which the surface was blackened by hydro sulphate of potassa. Comparing these two results the change of surface appears to have increased the radiating power in the ratio of 1.04 to 1.

The coatings applied to cylinder No. 3 were more varied than those of either of the foregoing.

Cylinder No. 3.

Nature of coating.	Colour.	Date.	Observed time of cooling.	Time of cooling of standard.	Reduced time of cooling.	Remarks.
			sec'ds.	sec'ds.	sec's	
Carb. of magnesia.	Yellowish white.	Oct. 11	859.5	862	1011	Rough, in specks projecting.
Carbonate of lime, (chalk)	White.		879		1034	do.
Carbonate of lead.	White.		877		1032	Smooth and somewhat shining.
Prussian blue.	Blue.	25	805	937	871	Rough.
Litmus.	Blue.	31	831	969	870	Not uniform.
Bichromate potassa	Reddish brown.	Nov. 1	854	894.5	986	Streaked and not smooth.
Alkanet.	Crimson.	11	926.7	950	989	Uniform.
Do. rendered blue by potassa.	Blue.		938.2		1001	
India ink.	Black.	17	776	819	959	Not smooth,
do.		18	836	869	976	More uniform, (mean 697)
Carbonate of lead in oil of lavender.	White.	21	843.5	862	992	Uniform, but not glossy on surface
Do. blackened by hydro sulphate of potassa.	Black.		850		1000	

The effect of changing the crimson of alkanet to a blue was apparently to decrease its radiating power about one per cent, or the change of colour in reality did not alter the power. The carbonate of lead lost also slightly, or rather was not affected, by the change not only of its surface, but of a considerable part of its mass, for the oil of lavender having evaporated, the hydro sulphate of potassa penetrated the coating. The substance by means of which the coating was applied, seems not to have sensibly affected the radiating power; the carbonate of lead applied with gum differing in radiating power but four per cent. from that applied with oil of lavender.

The colours rank from the foregoing table, blue, two varieties; black, brown, crimson, white, black, blue, white, three varieties. There is no certainty that the litmus and alkanet, changed to blue by potassa, were originally the same in colour. The surfaces were very different in regard to uniformity and smoothness; the alkanet was perfectly uniform, but not at all glistening; it may be described as of a uniformly minute roughness. In this table, we have the greater number of whites at the bottom of the scale of radiation, and of blue and black at the top; but this is all that can be said, for a white, a

black, and a blue, are in close proximity near the middle of the scale.

The results, with cylinders Nos. 4 and 5, were few in number. They are subjoined.

Cylinder, No. 4.						
Cochineal,	Crimson,	Nov. 1	8485	894.5	962	Not uniform.
Chromate of lead,	Yellow,	6	931.7	948.5	996	Very smooth and uniform.
Bi-sulph't. of mercury, (vermilion)	Red,	11	843.7	950.2	888	Uniform & smooth.
Sulphate of baryta,	White,	15	759.2	865.2	889	Rough.
Ditto,	"	21	829	861.7	975	Smooth, freshly precipitated.
Cylinder, No. 5.						
Gamboge,	Olive,	Oct.29	845.5	934	917	Smooth.
Bi-sulphuret of tin, (aurum musivum,)	Yellow,	31	969	969	1014	Very even.

The order from cylinder No. 4, is red, white, crimson, white, yellow; the influence of the roughness of surface is here plainly shown, by which the place of the white material, sulphate of baryta, is entirely changed; this is a quality difficult to appreciate, and yet here we find it exceeding in influence any other property of the coating.

A review of these results will show that we have been able to establish, among the separate series, no order of colour; we have the different orders as follows:

From No. 1.	No. 2.	No. 3.	No. 4.
White,	Green,	Blue,	Red,
Red,	Brown,	Black,	White,
Brown,	White,	Brown,	Crimson,
Orange,	Blue,	Crimson,	White,
Black,	White to black, an increase of 4 per cent. in radiating power.	White,	Yellow.
Green,		Black,	No. 5.
White to black, an increase of 3 per cent. in radiating power.		White,	Green,
		No effect from changing white to black, or purple to blue.	Yellow.

A more satisfactory comparison, in respect to the number of substances employed, will be had by using the means, heretofore described, for comparing together the results obtained with different cylinders. For example, Nos. 1, 2, and 3, were each coated with carbonate of lead, and through the numbers given by these coatings, those found for the other coatings can be compared; Nos. 1 and 4 were coated with vermilion, and Nos. 1 and 5 with gamboge.

The following table presents the comparison, the substances being arranged in the order of their radiating powers.

Number.	Nature of Coating.	Colour.	Number of Cylinders.	Date.	Time of Cooling. sec's.	Remarks on Surface.
1	Litmus blue,	Blue	No. 3	Oct. 31	728	
2	Prussian blue,	Blue	3	25	729	Rough.
3	Ammoniacal Sulphate of copper,	Greenish blue	2	Nov. 6	789	Rough.
4	Per-oxide of manganese,	Brownish bl'k	2	18	804	Not shining, but uniform.
5	India ink,	Black	3	17	804	Not smooth.
6	Bi-chromate of potassa,	Brown	3	1	810	Streaked, streaks smooth.
7	India ink,	Black	3	18	817	Smooth.
8	Alkanet,	Crimson	3	11	823	Not shining, but uniform.
9	Carbonate of lead in oil of lavender	White	3	21	830	Smooth, not shin'g
10	Sulphuret of lead,	Black	3	21	837	
11	Alkanet blue,	Blue	3	11	838	
12	Carbonate of magnesia,	White	3	Oct. 13	846	Rough.
13	Carbonate of lead in gum,	White	1	24	864	Smooth.
14	Carbonate of lime,	Dingy white	3	11	865	Medium.
15	Vermilion,	Red	1	25	872	Smooth.
16	Sulphate of baryta,	White	4	Nov. 15	873	Rough, blueish white.
17	Golden sulphuret of antimony,	Brown	1	Oct. 31	909	Smooth, in streaks
18	Indigo,	Blue	2	Nov. 11	912	Smooth.
19	Cochineal,	Crimson	4	1	944	Smooth.
20	Red lead,	Orange	1	6	952	Smooth.
21	Sulphate of baryta,	White	4	21	957	Medium.
22	Plumbago,	Black	1	17	974	Not shining, but uniform.
23	Chromate of lead,	Yellow	4	6	977	Smooth.
24	Gamboge,	Olive green	1	20	1005	Smooth, in streaks.
25	Bi-sulphuret of tin,	Yellow	5	Oct. 31	1085	Smooth.

The results thus exhibited are decidedly unfavourable to the specific effect of colour in determining the radiating powers of bodies. Blue is above black at the beginning of the table, and occurs again in the eighteenth place. Although the first seven numbers are blue or black, the ninth, tenth, eleventh, and twelfth, are white, black, blue, and white, respectively. Red occupies the eighth and nineteenth places, and then an intermediate one, namely, the fifteenth. White is in the greater number of cases in the middle part of the table, ranging close to black.

The alleged advantages of dark clothing during cold weather, thus seems to have been too hastily inferred; and it appears that, provided

the person is not exposed to the sun, the particular colour of the clothing is not of real importance.

If colour is not a determining quality, neither does roughness appear to be so, for though generally the smooth surfaces are lower on the list, this is not universal. The rough sulphate of baryta is lower on the list than the smooth carbonate of lead. Plumbago occupies a low place, and India ink a comparatively high one.

The best radiators do not appear to belong to any particular class of bodies; litmus blue and Prussian blue are side by side, while sulphuret of lead, and the bi-sulphuret of tin, are fifteen numbers apart.

If the results be admitted as decisive of the radiating powers of the bodies used, they show that each substance has a specific power not depending upon chemical composition, nor upon colour. I do not claim to found such a conclusion upon the experiments; their object has been before stated, and if they shall prevent the introduction of an inference from an imperfect induction, as a law of science, the labour bestowed upon them will be amply recompensed.*

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Suggestion of Methods for Preventing Annoyance from Sparks issuing from the Chimneys of Locomotive Engines. By Erskine Hazard, *Civil Engineer.*

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen:—Having experienced great inconvenience from the sparks, dust, and smoke, of locomotives, when traveling on rail-roads, I have thought of several ways of obviating the annoyance, and take the liberty of suggesting the following, which, if you think them worth a trial, you will please publish in your valuable journal.

Fig.1

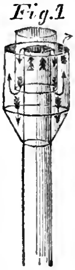


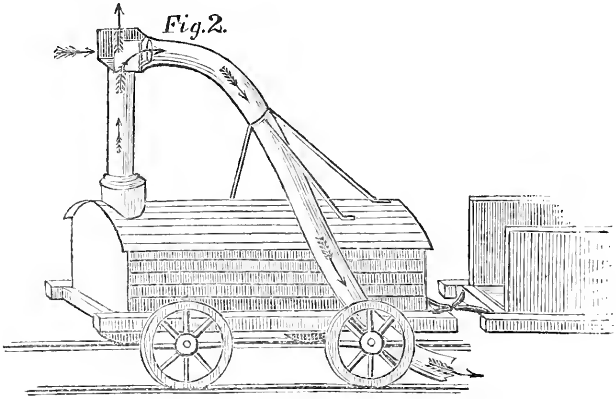
Fig. 1 is a plan to catch the sparks. It consists of a cylindrical cap of sheet iron, closed at the upper end, inverted over the top of the chimney, and extending say ten or twelve inches down its sides, to be made as much larger in diameter than the chimney, and of such length as will leave sufficient area for the smoke to pass out between the cap and chimney. The cap is to be supported by braces riveted to the chimney and cap. A sheet iron case, of still larger diameter than the cap, surrounds the upper part of the chimney for say four feet, and is closed at the lower end.

The course of the smoke would be turned downward and outward by the cap, and the sparks, having some weight, would continue their course into the reservoir formed between the chimney and case, (which would be rendered nearly a vacuum by the heat,) while the smoke would again rise into the atmosphere between the cap and the outer case. The diameter of the case will not require to be much greater than that of the cap, from the well known fact of the area of circles increasing in proportion to the squares of their diameters.

* The scientific reader need not be reminded that these remarks do not bear upon the radiation or absorption of heat accompanying light.

Fig. 2 is a portion of a square box of sheet iron, placed on top of the chimney. The top and front side of this box are entirely open. At the back of the box, a conical pipe is inserted, which passes backward and downward, so as to come nearly to the ground, either between or outside of the tracks of the rail-road.

Fig. 2.



When the engine is at rest, the smoke ascends, as usual, through the open top of the box, but as soon as the engine is in motion, the current of air through the back of the box and pipe, will deliver the sparks and smoke on the ground, and they would, probably, not rise in time to annoy the passengers.

Fig. 3.

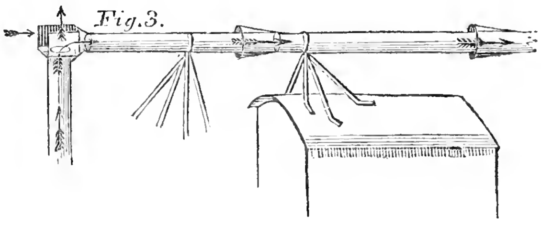
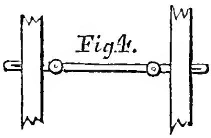
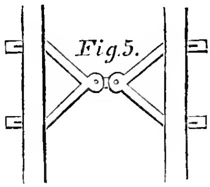


Fig. 3 is a different arrangement of the pipe, by which the sparks and smoke may be delivered at the back of a long train of cars. The pipe attached to the chimney bore passes backward, and enters the conical end of the pipe on the tender, which in its turn enters the pipe on the car, and so on to the end of the train. The conical ends of the pipes should be wide enough to accommodate the bends of the road, and should be supported by props at the fronts of the cars, while the hinder ends of the pipes are supported by the cones of the succeeding, the last pipe having two supports. To admit of this arrangement, it will be necessary to change the mode of attaching the

cars to each other, by substituting stiff bars for the chains now commonly used, and making the connection by a pin joint on each end of the bar, (Fig. 4,) at the centre of the cross pieces of the car frames, as has been long practised at Mauch Chunk. It will not be necessary that the pipes should fit each other accurately, as the motion of the cars will make the current inward at each cone. If the pipe has two supports, as the one at the engine would probably have, it would require the connecting bar between the carriages to be very short, as Fig. 5, the joint in the pipe to be immediately over it.





I shall be pleased if any of the rail-road companies should make a successful experiment from these suggestions.

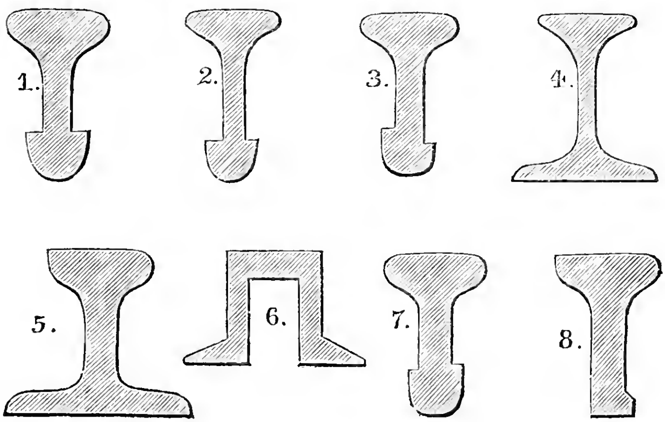
Erskine Hazard.

Philadelphia, September, 1835.

Sections of Rails used in the United States. By J. C. Trautwine, *Civil Engineer.*

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen,—I send for insertion in the Journal of the Institute, transverse sections of eight varieties of parallel rails, employed on different rail-roads in the United States. The figures are drawn to a scale of one-fourth the full size, and accompanied by a statement of the weights, per lineal yard.



		Weights.
No. 1.	Columbia and Philadelphia, per yard,	$41\frac{1}{4}$ lbs.
2.	" " "	33 "
3.	Germantown and Norristown, "	39 "
4.	Camden and Amboy, "	$39\frac{1}{4}$ "
5.	Boston and Providence, "	54 "
6.	Wilmington and Susquehanna, "	40 "
7.	Alleghany Portage, "	40 "
8.	Boston and Providence, "	40 "

On Steep Grades for Rail Roads. By A. C. Jones.

TO THE COMMITTEE ON PUBLICATIONS.

Gentlemen:—In reading the reports of new Rail Roads that are being located, I have been surprised to see that Engineers propose grades of one hundred feet to the mile, and state that locomotive engines will overcome them with ease;* this being only the case when the greater part of their load has been left behind, or when the assistance of another engine is afforded to aid the first one up the grade.

Inclined planes, with stationary engines, are serious evils on rail roads, and where the plane is such that it requires the power of another locomotive to surmount it, the evil is only lessened: far better would it be for the stockholders, if the engineer should lengthen the road five miles, than to make a grade over thirty feet to the mile.—Where the carrying trade is all one way there is an exception to this remark, but then such grades are not consistent with safety.

It will be admitted by all, that the state of the water in the boiler of a locomotive engine is of considerable importance, and any person who has seen locomotive engines with boilers on Mr. Stephenson's plan, will not have failed to notice the great change in the height of the water in the boiler, in passing from a level down a grade of twenty-five feet to the mile. This is easily accounted for, by the angle which the grade makes with the horizon, and as the water in the boiler will find its level, it flows to the lowest end: moreover the centre of gravity being thus moved forward increases the weight on the springs in front, which are straightened in proportion, while part of the weight being removed from the hind part of the carriage the elasticity of the springs will raise it up, and the cap of the fire box, and part of the flues, are liable to be left dry.

It may be urged by some, that the ebullition in the boiler will keep the flues wet; but as it is known, that in descending a grade exceeding one hundred feet, no steam will be required, and there being consequently no draught, the water will not be in violent ebullition.

Respectfully yours,

A. C. Jones.

Portsmouth, Va. Aug. 20th, 1835.

* I have not seen the official account of the experiment of ascending the one hundred and seventy-six feet grade on the Baltimore and Ohio rail road; but it is not prudent to take a single experiment as a basis by which to form grades.

FRANKLIN INSTITUTE.

Monthly Conversation Meeting.

The first conversation meeting of the Institute, for the season, was held at their Hall, September 25th, 1835.

Mr. Franklin Peale exhibited a model of a coining press devised by him, after a visit of inspection abroad. The toggle joint is substituted for the screw in this press. Mr. Peale described the mechanism of his press, gave a general account of the methods of coining in use in England, France, and Germany, and of the improvements of which our own methods are susceptible.

Mr. John H. Schrader showed a slide rest made by him, and having both a rough and a fine adjustment for centering the article to be turned.

Upon the table was a specimen of the Ailanthus tree, the valuable properties of which were described by the President of the Institute, in the September number of this Journal.

Messrs. Carr & Lunt exhibited a very ingenious machine for tenoning the spokes of wheels, invented by Mr. Wm. Gerrish, of Portsmouth, New Hampshire.

Prof. A. D. Bache explained a simple and portable apparatus devised by Prof. Courtenay and himself, for oscillating a magnetic needle, to obtain the horizontal intensity in a rarified medium.

Mr. Turner Risdon sent for examination a tool used by the makers of coach bodies, for forming grooves for the insertion of pannels. This tool was simple, and judged to be well adapted to the intended purpose.

Committee on Science and the Arts.

Report on Mr. D. H. Hackman's Mathematical Chart.

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination, a Mathematical Chart, designed by Mr. D. H. Hackman, of Pittsburgh, Pennsylvania, REPORT:—

That the said chart is intended to present to the eye, *first*, a distinct view, in figures, of the most important lines, surfaces, and solids, treated of in works of practical geometry and mensuration, with the name of each conspicuously exhibited, and the different figures variously coloured, to avoid confusion in studying the separate objects contained in the plate; *second*, a concise definition, in language, of the several matters embraced in the chart, and a series of the most useful problems in mensuration, trigonometry, surveying, &c., with tables of weights and measures, and a variety of practical instructions relating to subjects with which mathematical calculations are connected.

The committee do not think it necessary to make any remarks upon the utility of presenting to the eye, and in the most clear and intelligible manner, the important truths which this chart is intended

to illustrate, since all who have *well* learned these truths, must *know* the value of such an exhibition, and all who have acquired but an imperfect knowledge of them, must have *felt* the want of some similar method to aid in their acquirement, or recollection.

The design of this chart appears to have originated with the author, and, though it relates to things long known and familiar, is not the less entitled to approbation, since it gives a facility and satisfaction in the acquisition of a department of knowledge, often rendered difficult and repulsive by the manner in which it is exhibited to the student.

The language of the definitions, axioms, and rules, is clear and expressive, and the order in which the subjects are presented is, in general, that of their dependence upon each other.

It is believed that schools, private students, and practial men, will be alike benefitted by having at hand a copy of this chart.

By order of the committee.

William Hamilton, *Actuary.*

September 10*th*, 1835.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN APRIL, 1835.

With Remarks and Exemplifications, by the Editor.

1. For *Regulating the Height of Water in Steam Boilers;* Jesse Fox, Lowell, Middlesex county, Massachusetts, April 2.

"This machine, apparatus, or pump, resembles a common force pump, having one valve, a cylinder, piston, or plunger, one inch in diameter, and making a stroke of four inches. It is attached to the boiler at the water line, and is kept in constant operation, and fills from, and discharges itself again into, the boiler; it operates upon the supply pump. When the water in the boiler is below this pump, or apparatus, it fills with steam from the boiler, and the valve between the pump and the boiler being shut, and pressure applied to the piston, or plunger, the steam in the pump is compressed; by taking advantage of this circumstance, the supply pump is put into gear, or motion, and continues until the water in the boiler rises to the pump, when it fills with water, and although pressure is applied upon the piston, or plunger, water being incompressible, it will not yield, by which circumstance the supply pump is thrown out of gear, or stopped; thus stopping and starting, the water in the boiler is kept constantly at the point, or nearly so, to which the apparatus is attached."

The part of the description following the foregoing quotation, refers by letters to a drawing of the apparatus, after which there is the following claim.

"What is claimed as new, is the application of pressure to a portion of the steam and water of steam boilers, insulated or taken from a particular point in the boiler, for the purpose of supplying the boiler with water, or ringing a bell, or giving an alarm, when the water in

the boiler has fallen to a particular point, and such apparatus or machinery as is above mentioned, and so much and such parts of the machinery and apparatus aforesaid in combination, as is necessary and proper for effecting the purpose aforesaid."

If this apparatus would answer the proposed purpose, so also would several contrivances which have preceded it; but we are convinced that all plans must fail which depend upon the assumption that water highly heated in a boiler, and from which steam is escaping at every stroke of the piston to supply the cylinder, is in a quiescent state, like cold water in a reservoir. What engineer does not know that water may be blown into the cylinder through the steam pipe, when, at the same time, there is not a drop too much in the boiler?

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2. For *Apparatus for Regulating the Temperature of Rooms, producing an Alarm in case of Fire, &c.;* Bradford Seymour, and Squire Whipple, Utica, Oneida county, New York, April 2.

The modes employed depend upon the expansion of mercury by heat, or the bending of a compound bar, the two sides of which are of different metals, expanding differently by the same increment of temperature. When mercury is used, it may be confined in a tube, and made to raise a float of wood, which, at a certain elevation of temperature, will cause an alarm bell to ring. A similar effect, it is manifest, may be produced by the compound bar.

"What we claim as our own invention, and not formerly known in the above described principle, instruments, and apparatus, are the application of the expansive force exerted by bodies on the application of heat, to the purposes of a fire alarm. And the form and arrangement of the different kinds of apparatus and instruments herein above described, for such application, and for any other purpose to which they may be applied."

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3. For a *Thrashing Machine;* Luther Carman, Oxford, Oxford county, Maine, April 2.

We have in the specification of this patent, a long description of a thrashing machine, and a horse power by which it is to be driven, they being treated as though they constituted but one machine; but, apart from this, what are represented as novelties, merit this character about as perfectly as would a claim to drive four nails, where three had been formerly used; it consists entirely in the peculiar manner of putting the parts together.

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4. For a *Pump,* denominated the Tread Pump; Heinrich Bachmann, an alien, who has resided two years in the United States; Lancaster, Lancaster county, Pennsylvania, April 2.

We are told that, "by the application of this machinery, the long desired object is attained, to raise, with a trifling exertion of power, a much larger quantity of water in a shorter time. This is effected by substituting, in the place of the common pump handle, a pendulum fastened to the middle of an iron axletree, on one end of which a

double treading board is fixed, and on the other end a cog wheel, moving in a rack, which is fastened to the lower end of the lever beam. By treading the board, the pendulum is put into a swinging motion, which causes the cog wheel to move in the rack, and to draw the lever beam up and down."

"By means of this invention, it is possible to draw up water out of the *deepest* well, in large quantities, and with perfect ease."

A piston is described and figured, and its employment made a part of the invention claimed, but for what reason we are unable to ascertain, as its general construction is not new, and no particular parts are pointed out by the patentee as possessing this character.

This pump, we are informed, may be made to answer the purpose of a fire engine, where water is not to be raised "more than twenty feet higher as the spot where the pump stands." No account whatever is taken of the depth of the well, or reservoir, from which the water is to be obtained, a circumstance worthy of some consideration. But the fact is, that the whole affair manifests a want of acquaintance with the subject of hydraulics, as is evinced by the initiatory declaration that, by the method laid down, water may be obtained in large quantities, from the deepest well, with a trifling exertion of power. In the drawing which accompanies the specification, a man is represented as treading the double board, much at his ease, and he might as well "stand at ease," as to attempt, by his individual power, however applied, to draw water in large quantities from one of the deepest wells. A man has the power to raise a given weight to a given height, in a given time, and it is not possible, by any mechanical arrangement, to enable him to do more; his power may be applied disadvantageously, and, in consequence thereof, a portion of his efforts be wasted; to prevent which, the skill of the machinist is called forth; but beyond this point, if he have skill, he does not attempt to go. The tread board, as proposed in the present patent, has neither the merit of novelty, nor of being the best mode of applying power, and we have so often of late had to decry the schemes for applying the power of the pendulum, that we do not think it necessary to repeat the objections to its use, or again to insist upon the fact that it gives no power, but actually destroys a portion of it.

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5. For a *Straw Cutter;* John Deakyne, Petersburg, Dinwiddie county, Virginia, April 2.

The things claimed in this machine are, "*First.* The method of obtaining the bearings for the feeding rollers, by lapping the sides of the box on the sides of the mouth-piece, the axes of the rollers resting on the mouth-piece, and working against the ends of the side-boards. *Secondly.* The method of fixing the cutters to the arms of the fly-wheel, by securing them to pieces of iron, and then securing the pieces of iron to the arms of the fly-wheel by screws, or in any manner that will permit them to be movable on the arms." It will be seen that these claims refer to matters of arrangement only, the general construction of the straw cutter not differing from such as are now in use.

6. For an improvement in the *Grist Mill*, applicable also to the grinding of paint and plaster; Cephas Manning, Littleton, Middlesex county, Massachusetts, April 2.

This is another portable mill for grinding grain, &c., in which is claimed, "A new and useful method of arranging and supporting the stone of a grist mill, by which the upper stone shall be stationary, and the lower stone shall be the runner, or revolving stone. A new and useful method of dressing the stones of a mill by curved grooves, hereinafter to be described. A new and useful method of supporting, and of preserving the parallelism of, the runner."

As the lower stone has repeatedly been made the runner in such mills, the doing this cannot become the subject of a valid claim, and we do not see any thing peculiar in the mode of effecting it, as described by the patentee. The manner of dressing the stones is by laying out the furrows in curved lines from the eye, or centre, to the periphery; the curves to vary according to the velocity intended to be given to the stone, &c. The lower stone is to be made fast to the vertical shaft by passing screws through four arms upon which its under side rests, these screws serving also to regulate its parallelism.

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7. For a *Cooking Stove;* Anthony Abbott, Portland, Cumberland county, Maine, April 2.

There is no claim made to any part of this stove, nor do we know of any thing in it which ought to be claimed. The whole of it, we are told, is to be of cast-iron, with the exception of the "coal oven," meaning an oven with an arched top, which is to be double, that the flame may play round it. The description is obscure, but the drawing shows the form intended to be given to the stove, and this, we believe, is in some points new; otherwise we should be at a loss to give this character to any part of it.

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8. For a *Papillary Shield;* William Buxton, Woburn, Middlesex county, Massachusetts, April 2.

A circular stock of wood, or ivory, is to be turned, about two inches in diameter where it rests upon the breast; it is perforated in the centre to receive the nipple, and is surmounted by a gum elastic sheath, or teat, for the mouth of the child, which slips over a piece of metal, covering the top of the stock.

"The invention described has not, to the knowledge of the inventor, been used in the United States, or any other part of the world; he has seen a shell of pewter, with a teat cut from a calf attached to it, for the child's mouth, but which answers no good purpose, producing only disgusting effects; with this instrument, which has never been patented, to the knowledge of the petitioner, he claims not to interfere."

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9. For *Wheels and Axletrees;* Aaron Hale, Boston, Massachusetts, April 2.

The rim and spokes of this wheel are to be of wrought iron; the

rim is to be drilled and tapped, to receive the ends of the spokes, upon which screws are cut. The spokes are to be confined to the hub between face plates, which pass over each end of a cart hub, and are confined together by screws. One half of the spokes are to be confined at one end, and the others at the reverse end, forming counter braces to each other; there are excavations on the face plates, and on the ends of the hub, to receive and clasp the spokes. "Now, what I claim as my invention and improvement in the above described wheel, is the arrangement and the fastening the spokes into the felloe, by screwing them in."

The screwing of felloes and spokes together in this way is not new; it has been done, and the inner ends of the spokes have had the hub cast upon them; but they have become loose and shackling, and we very much doubt the permanence of those made and secured on the plan of the patentee.

The axles are to have a groove cut along their upper sides to receive oil, the formation of which groove constitutes the claim in this part of the invention. To the drawing there are no "written references."

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10. For a *Combined Rotary and Stationary Spindle;* Charles Jackson, Stephen S. Potter, and John Miller, Providence, Rhode Island, April 2.

This spindle, as the name indicates, is to be divided into two parts; the upper portion, which carries the flyer, revolves in a cast-iron rail at the top of the spindle, there being a whirl on it just below the rail, and immediately below this the flyer forks off; the spindle descends about an inch within the flyer, and tapers to a blunt point. It is perforated through the centre, at top, and laterally under the whirl, to allow the yarn to pass through, and to the curl of the flyer.

The stationary spindle is capable of sliding up and down in cast-iron cross bars; it is lowered when a spool is to be put on, and has a contrivance for keeping it in place when raised. It is perforated at its upper end to receive the tapered end of the revolving spindle, the point of which rests against the bottom of the perforation. The upper spindle is kept from falling by a tightening wire, which crosses the frame under the whirl.

"We claim as our invention,—

"1st. The method of spinning or twisting yarn, thread, or roving, with a rotary spindle, pointed at its lower end, and bearing on its point at the bottom of a hole in the upper end of a stationary spindle.

"2nd. The application of a tightening wire in the manner above described, to support the rotary spindle when detached from the stationary spindle.

"3d. The application of a collar with a handle, and the slit in the rail to support the stationary spindle.

"4th. The manner of removing the stationary spindle from the slit in the rail, for the purpose of putting on and taking off the bobbins."

11. For a *Truss for the Cure of Hernia;* J. W. Hood, M. D., late of Clarke county, Kentucky, but now of the city of Philadelphia, April 2.

The drawings illustrative of this improvement are extensive, and the specification of great length; the apparatus has been employed with extraordinary success, producing a radical cure in numerous cases, some of which we have witnessed; the patentee is about bringing forward some improvements, when we will furnish an epitome of the whole system; at present, we give the claims only, which are appended to the specification of the above named patent.

"Although I have, in the foregoing specification, designated the precise number of pads which I successively employ in the various species of hernia, and have given particular admeasurements for certain belts used by me, it will be manifest that in these and other particulars, I do not intend to limit myself by the terms employed, but in all cases to use a sound discretion, governing myself by existing circumstances. I have employed these numbers and admeasurements for the purpose of clearly exemplifying the principle under which I proceed, and for no other.

"What I claim, therefore, as my invention, and wish to secure by letters patent, in the within described instruments, consists of the first pelvic belt, with its appendages, as described, and also the mode of applying it; the rupture pad, however, being similar to others now in use, I do not claim. I claim the second pelvic belt, with its application as described. I claim the umbelical belt, and its mode of application, but except from this claim the spiral spring by which the metallic plates are connected. I claim the employment of the night belt, in the manner, and for the purpose, herein designated. I claim the three inguinal pads, or any variation of that number involving the principle upon which they are constructed and applied; and I also claim the ventro-inguinal, scrotal, femoral, and umbelical pads, varying in size and form, according to the indications of their successive application, as set forth. I also claim the successive additions and abstractions of the folds of silk, or other substance, under the pads, regulated by the state of the patient, and the progress of the cure. Intending to include all those modifications of the foregoing apparatus which leave them substantially the same, so that similar effects are produced by analogous means."

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12. For a *Water Wheel;* Alvin and Barton Darling, Bellingham, Norfolk county, Massachusetts, April 3.

This is called "The upright perpendicular pressure wheel, with spiral floats." There is so little substantial difference between this and several of the wheels called reaction wheels, that we think it unnecessary to give any of the particulars of its construction; we could not, in fact, tell what the patentees view as constituting their improvement, as they have omitted altogether to communicate this important information.

13. For *Hair Combs;* George Hooker, Bristol, Hartford county, Connecticut, April 3.

The claims set up by this patentee are to the making of combs out of plates of metal of any kind, so that the back and teeth shall be in one entire piece; and to the beading, or bending, the back, so as to stiffen and keep it in proper shape. Our eyes have deceived, or our memory failed, us, if these claims can be sustained.

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14. For a *Thrashing Machine;* William G. Johnston, Bridgetown, New Jersey, April 3.

This thrashing machine, we are informed, is to be constructed and mounted like other cylinder thrashing machines; but the beaters and spikes, instead of being fixed to the cylinder, are to work upon joints which will admit of their giving way after making the stroke; it is intimated that there are other novelties about the affair, but these being of minor importance, are not claimed, and if they are as old as the major improvement, it was well enough to omit them.

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15. For a *Grist Mill;* Elisha Holton, Westminster, Windham county, Vermont, April 3.

We will not say that we have here another modification of the portable grist mill, but merely another portable grist mill. The patentee, however, has not failed to furnish a list of those parts which he considers as new, but we do not think it necessary to copy his claims.

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16. For an improvement in the *Wheels for Cars and Locomotive Engines, and also in the Boiler Tubes of such Engines;* Matthias W. Baldwin, city of Philadelphia, April 3.

(See specification.)

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17. For an improvement in the *Lathe for turning Lasts, and other irregular forms;* Cullen Whipple, Jonathan Sprague, and Milton D. Whipple, Douglass, Worcester county, Massachusetts, April 3.

A patent was obtained by Thomas Blanchard, in the year 1820, for "a machine for turning and cutting irregular forms," and the patent, which had expired, was renewed by a special act of Congress, on the 30th of June, 1834. The present machine is for the same purpose, and is owned by Messrs. Carter & Hendee, of Boston, to whom it has been assigned, and who are the principal proprietors of Blanchard's machine. Lathes in which were turned figures of almost every form, were in use more than a century ago; there is nothing new, therefore, in the general principle of these machines, but only in the particular arrangement of the parts which are described. Such a machine as that now patented is necessarily complex, and cannot be described without drawings. The variations from Blanchard's machine which have been invented by the above named patentees, we shall not attempt to detail, as there are few persons to whom such

a description would be intelligible, from their being unacquainted with the former machine. It is these specific variations which form the subject of the claim.

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18. For a *Material for Stuffing Beds, Mattresses, &c.;* Joseph C. Smith, Cambridgeport, Middlesex county, Massachusetts, April 3.

The material to be employed is palm leaf, which is to be reduced, by heckling, into filaments, or fibres; these are then to be spun into ropes, and so tightly twisted as to kink the spun material into balls; these are to be put into a steam oven, and so baked as to fix the curl, or twist; when untwisted, it is "a light, elastic, and durable article for stuffing."

A short time since, a patent was obtained for using the fibres made from palm leaf as a stuffing for mattresses, &c., and we then expressed a doubt of the validity of such a patent; if, however, it should be found to be valid, the present patentee has been forestalled by being deprived of the material itself, which he could employ only under a license; but if we were correct in our judgment, the foregoing patent for the mode of rendering the substance used essentially fit for the purpose, would be good. The process is similar to that employed with curled hair.

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19. For *Saw Mill Dogs;* Benjamin F. Snyder, Painted Post, Steuben county, New York, April 3.

There is to be a sliding block crossing the carriage, which rack is moved by an endless screw on a revolving shaft. A toothed wheel, and a ratchet and pall on the end of the shaft, are employed to move the log the proper distance. A dog, with a flat bearing, serves to bear against the log. The parts claimed are, "the entire propelling power of the machine, together with the spiral spring, and the short or flat dog attached to the moving slide under the roller."

The apparatus is very imperfectly described; the *spiral spring*, which is claimed, is not alluded to in the description; and although the drawing furnishes a tolerable idea of the general arrangement, it is altogether deficient in particulars.

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20. For an improvement in *Manufacturing Iron Chests;* Charles J. Gayler, city of New York. First patented April 12th, 1833; patent surrendered, and reissued upon an amended specification, April 3, 1835.

A brief notice of this patent was given in vol. xii., p. 239, and it appears that the specification was found to be defective and invalid in a trial in the District Court of the United States for the Southern District of New York. If, on this trial, the patent was declared void, we very much doubt its being renewable by the present procedure; for although the law authorizes the surrender and renewal, or rather the reissuing, of a patent which has been originally issued under a specification defective from inadvertence, it would seem necessary that

the person surrendering should have something to surrender; but if his patent is repealed, or declared void, in due course of law, the patentee appears then not to be within the pale of the act admitting of amending a specification. This is a point upon which we believe that there is no legal decision on record; our remarks, therefore, are merely the result of our own impressions.

The following is the concluding part of the amended specification.

"The object of my improvement in forming a chest within or over a chest, or a double chest, or safe, is to make an iron chest, or safe, more secure against fire, or thieves.

"I claim as my invention, the construction, or formation, of a double iron chest, or safe, by the union, or combination, of two iron chests, made one within, or over, another, which, on the outside, has the appearance of but one chest, with doors shutting one over, or upon, the other, but is really two chests, combined, and firmly united and secured to each other."

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21. For an improvement in the *Bridge*, usually called Town's bridge, obtained on the 28th of January, 1820; Ithiel Town, city of New York, April 3.

The original bridge is well known as consisting, mainly, of timbers placed diagonally, and crossing each other so as to form a lattice work, into which pins, or trenails, were inserted at each intersection, there being suitable horizontal string pieces at the top and bottom of the trellis work. In the improved bridge, these side trusses are to be doubled, the claim being to "the addition of another similar set, or series, of bracing, of similar kind and dimensions, to be placed in a similar manner, either directly opposite to the former, or in any other manner, so as to bring the second tier not opposite to the former, but so that all the intersections of the braces of the latter series shall fall between those of the former braces on the horizontal string pieces." "One, two, or more, of these trusses, with a floor, and other necessary parts, as usual, will constitute a bridge thus improved."

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22. For a *Screw Press;* Thomas Gilpin, Brandywine Paper Mills, Wilmington, Delaware, April 3.

The screw in this press is to have a shaft, equal in length to itself, upon which no screw is cut; this shaft may be either square, polygonal, or cylindrical; if of the latter form, it is to have a groove its whole length, to receive a feather in the bored hub of a wheel through which it is to slide; if angular, the hole in the hub is fitted to receive it. The opening in the centre of this wheel allows the shaft to slide easily through it, and the wheel may be turned in any convenient way, but an endless screw crossing the frame of the press, and taking into the teeth on the wheel, is preferred. The wheel is confined between cheeks, and when it is turned, the press screw working in a box in the usual way, the follower is moved as desired.

23. For a *Thrashing and Hulling Machine;* Samuel S. Allen, Saratoga Springs, Saratoga county, New York, April 3.

The patentee says, "All that I claim as my invention, is the employment of the semicircular plates, or other contrivance, by which a semicircular groove can be formed, admitting of the increase or diminution of the concave bed, in the manner, and for the purpose, described; adapting the one machine, by this means, to the better thrashing of grain in its different states, and also to the hulling and cleaning of clover, and other seeds."

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24. For a *Horse Power;* Samuel S. Allen, Saratoga Springs, Saratoga county, New York, April 3.

This is one of those horse powers in which the horse walks round in the old-fashioned way. The improvement claimed is in the mode of gearing the wheels, and consists in "passing the second vertical shaft into, or through, a socket within, or below, the main driving wheel, by which the gearing is rendered more simple and compact; and the particular arrangement and combination of the parts by which this is attained."

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25. For an improvement in the *Construction of Fire-places and Chimneys;* Reuben Bacon, and Elijah Harris, Boston, Massachusetts, April 8.

A mantel front is to be cast in one piece, and to this cast-iron jambs are to be fastened by bolts; this front is to be surmounted by a cast-iron mantel shelf, with an aperture in it for the funnel, or flue, for the emission of smoke. A front plate of cast-iron is to be placed on the shelf, and to extend up to the ceiling; this plate is to be perforated with holes, to "allow the heat from the fireplace to escape into the room; this front makes the whole finish of that part of the room."

The funnels and flues are to be of cast-iron, as also may be the toppings of the chimneys.

The drawing is a rude sketch, without references, and the specification is without a claim; most parts of the contrivance have nothing new to recommend them, and those which may be new will not recommend themselves.

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26. For a *Chisel for Mortising Window Sash, &c.;* Charles Rinehart, Marietta, Lancaster county, Pennsylvania, April 8.

This chisel is to be of the form of the mortise to be made; it is to have four cutting sides, and those two which cut across the grain are to be left an eighth of an inch longer than those which cut with it. A hole is to be bored before mortising, and the chisel may be used either with a mallet, or by some forcing machinery. The hole in the chisel is to be about two inches and a half in length; but to allow the chips to escape readily, it is to be cut away on one broad side, so as to leave about three-quarters of an inch only, above the cutting edge.

Such chisels have no claim to novelty, as they have been often

made. They are troublesome to keep in order; but if well made, well kept, and properly used, they answer well for certain special purposes.

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27. For a machine for *Pressing Brick from Dry Clay;* Nathan Sawyer, Mount Vernon, Knox county, Ohio, April 8.

Many machines have been made for the purpose of pressing brick from dry clay, the clay being first pulverized and sifted; the power required to make good brick in this way is immense, and most of the machines have failed from their insufficiency in this particular.

In the machine here patented, the pressure is applied by means of a toggle joint, which, we are of opinion, is the best arrangement for the purpose. One of the machines is at work in this city, (Washington,) and upon weighing the bricks made by it, we have found them, when baked, to weigh upon an average nearly eight ounces more than good stock brick of the same size, and from the same yard, made in the usual way.

The general arrangement of the press we do not think it necessary to describe, but will give some extracts from the specification, concerning points which can be understood without a drawing.

The moulds are made of cast-iron, and lined with steel plates. "The sides of the mould are made concave on the upper edge, the concavity commencing about one inch from the end of its interior, and descending in the middle about an inch; the intention of this will be presently explained." "When the machine is to be used, the clay is prepared by coarsely pulverizing it, and passing it through a screen, the meshes of which measure about one-fourth of an inch, thus reducing the lumps to a proper size, and separating it from pebble stones. The moulds are to be filled by means of a spade, and the superfluous material scraped off by its side. The hollows, or concaves, on the edges of the mould, leave a larger portion of clay at each end than in the middle, without which the bricks would be unsound at their angles, but, by this provision they are rendered perfectly sound. Four bricks are made at every revolution of the crank shaft; and for ordinary brick it may perform six revolutions in a minute, but for the best brick four revolutions are as many as will be proper. The bricks as they are lifted, may be either placed under a shed to dry, or taken at once to the kiln, but they will be better if allowed to dry before they are baked.

"I do not claim, as my invention, the progressive levers, the crank shaft, or the other parts of the machine separately and uncombined; they having, in general, been previously known and used as elements of other machines; but what I do claim as my invention is that general combination and arrangement of the respective parts as herein described, by which this machine is distinguished from all others that have been constructed for the same purpose. I also claim the giving to the mould such a form as shall cause the material with which it is filled to be so much deeper in certain parts, before it is pressed, as will suffice to render the brick, when pressed, as dense and solid at the angles as it is at other parts, whether this be effect-

ed precisely in the manner described, or in any other by which a similar effect is produced by analagous means."

28. For a *Thrashing Machine*; Henry Heberling, Short Creek, Harrison county, Ohio, April 8.

A cylinder and concave are to be set with teeth which do not differ from such as are already in use; the novelty depended upon being in the construction of the concave. Five round iron rods are so arranged as to form the concave, extending along the length of the cylinder; holes are drilled into these rods to receive the teeth, and they work on gudgeons passing into cheeks at each end, so as to admit of the teeth turning down out of the way should hard substances find their way in among them. The gudgeons at one end pass through the cheeks, and have curved levers attached to them, upon which spiral springs operate so as to bring the teeth back to the proper position after the hard substance has passed over them. This is the only part claimed.

29. For a *Horse Power*; John Brandon, Williamsport, Lycoming county, Pennsylvania, April 8.

This, like No. 24, is a horse power in which the animal walks round, and turns a shaft by means of a lever; the things claimed are mere matters of arrangement, and consist in "the plan for adjusting the shafts and gearing in a portable horse power, by wedges, or keys; and the adapting of the bore in which the first shaft runs to the sustaining of the weight of the first driving wheel, as described."

30. For a *Mortising Machine;* Erastus M. Shaw, Brooklyn, King's county, New York, April 8.

This patent is obtained for improvements on the patent obtained on the 21st of October, 1834. The claims made to the improved part consist in "the mode of working the cutters; the mode of working the carriage, and the mode of boring the holes."

31. For an *Auger for boring large holes;* N. J. Lampman, Coxsackie, Greene county, New York, April 8.

This auger is intended for boring the holes for large wooden press screws at one operation, and we see nothing more in it, than its adaptation, from its size, to the purpose intended, the principle upon which it operates presenting nothing new.

32. For a *Galvanic Apparatus, for the cure of diseases;* Daniel Harrington, city of Philadelphia, April 8.

The apparatus here patented is made in various forms, dependent upon the part of the body to which it is to be applied, but in all its forms it consists of two metallic vessels capable of containing warm water, and connected together by a metallic conductor. The claim is to "the construction of hollow instruments, made of different metals, so as to form a galvanic circle, to be applied in the cure of

certain diseases, and which are capable of containing warm water, or other heated material, for the purpose of exalting the electrical or galvanic effect." These vessels, and their connecting strips of metal, are usually covered with thick cloth, which is to be rendered conducting at the opposite ends of the arrangement, by moistening them with salt and water, or in any other convenient way.

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33. For an improvement in the *Power Loom;* William G. Gavitt, South Kingston, Washington county, Rhode Island, April 8.

The improvements here claimed consist, first, in what the patentee calls an acting and re-acting lever, which is intended to operate in such a way as to render the cloth more even than it is when made by the ordinary mode; and, secondly, a particular manner of fixing an index wheel, to show the quantity woven; the exact manner of doing these things would require a drawing, or a more lengthened description than we can afford.

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34. For *Spinning Straw, Hay, &c.,* for winding or packing Scythes, &c.; Philo G. Seldon, Winchester, Litchfield county, Connecticut, April 8.

The claim made is to "the adaptation of a spindle with its appendages, as described, to the purposes, and in the manner set forth. I claim nothing more, the general principle of its action being similar to that in other spinning apparatus."

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35. For a *Saw Mill Carriage;* Henry Gordon, Liberty township, Adams county, Pennsylvania, April 8.

Saw mill carriages; and other sliding frames, are to be made to run upon grooved friction wheels, which are to revolve freely in light frames that receive their gudgeons, and keep them at the proper distance apart. The claim is to the application of friction rollers, formed as described, for the purpose of checking the tendency to lateral motion in saw mill carriages, sliding bridges, and other similar structures, and also the application of friction rollers, either with or without grooves and fillets, to saw mill frames; such rollers not being fixed either into the saw frames, or fender posts, but working up and down between them."

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36. For a *Metallic Shingle;* Charles Southwick and Israel J. Richardson, Palmyra, Wayne county, New York, April 8.

"By this invention we claim every advantage to arise from the use of cast metal shingles of whatever form or construction the same may be, and every advantage to arise from the use of metal shingles of the construction of those above specified, to whatever purpose the same may be applied." It would seem from the foregoing claim that the patentees were not aware that roofs of cast iron of a similar construction have been patented in England. They may be seen described in the "London Journal," [Newton's] vol. 4, 2d series, p. 355; and in other works. The claim made to "every advantage,"

&c., is a claim to the effect, instead of to the means of producing it.

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37. *For a Composition to be burnt in Lamps;* Henry Porter, Bangor, Maine, April 8.

The composition is 1 lb. crude camphor, 1 gal. alcohol, rosin $\frac{1}{4}$ lb. spirits of turpentine 1 pint, tincture curcuma half an ounce; and thisis to be substituted for the alcohol and turpentine, or the alcohol, turpentine and camphor which have been before patented; the patentee pretends that it is much safer than the former articles, the rosin, however, must be injurious, and the curcuma merely gives the liquid a colour. If the former patents were good, we do not believe that the present could be sustained for merely adding the ingredients named.

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38. For *Generating Steam in Steam Boilers;* Wm. Scarborough, Savannah, Georgia, April 8.

A large portion of the specification of this patent is devoted to the theoretical views of the author, upon an assumption of the truth of which, he founds his improvement; we, however, dissent altogether from his theory, and doubt the advantage of the practice to which it leads. He first assumes, correctly, that the steam generated in a boiler presses upon the surface of the water with a force equal to its pressure on the other parts of the boiler. "It is next assumed that in proportion to the extent of this pressure, the particles, or molecules, of this water are *compacted* together, and that in proportion to the compaction is the difficulty of obtaining admission, or entrance, for the caloric, or heat, to the various particles, or molecules, of this water, which are to furnish the required vapour or steam." Much pains are then taken to prove "that this is no false theory," but throughout the whole, the non-escape of steam is confounded with, or mistaken for, the non-entrance of caloric; the author forgetting that the more dense bodies are generally the best conductors. We cannot enlarge upon this subject, or we should fill our journal; we therefore proceed to the claims:

"What I claim as my own invention for generating steam of high or low pressure, is the principles of transmitting the caloric through the medium of small horizontal, vertical, or diagonal pipes or tubes, at once to the centre, or other part of the fluid, which will have the effect of preventing the compacting or compressing against the more central and cooler parts of the said fluid, in consequence of the greater expansion of that part of it nearest in contact with the caloric.

"Also raising the water from below, and discharging the same through the apex of the cone, or through the pipes or tubes, above or below the level of the water in the boiler. There may be many methods of producing the same effect, but I claim the principle as set forth in my specification, however performed."

The cones named are situated, and to operate, something like the circulators of Mr. Perkins.

39. For the *Construction and Propulsion of Steam or other Boats;* William Scarborough, Savannah, Georgia, April 8.

What is claimed under this patent "in the described method of constructing and propelling steam or other boats, is the peculiar formation of the mode of the boats, or vessels, in combination with the increased celerity of the propelling wheels, to obtain by said combination a more rapid propulsion of the boat, or vessel, through the water; as also the application of the inverted tubes, and friction rollers, or wheels, as set forth. It is to be observed that I claim no originality to any of the parts separately."

It is no easy task to tell for what this patent is taken, as the description is rather discursive, and the individual things mentioned are confessedly not new. It seems necessary that when a patentee depends upon a new combination of known things, this combination should give a peculiar and well marked character to the thing as a whole; otherwise, although the fact may be disclaimed, the individual parts are depended upon to sustain the claim.

We are told that to decrease the resistance to the motion of a boat, the immersion must be reduced as much as possibie, so that it may skim over the surface of the water; that the bottom, therefore, should be, as nearly as possible, flat; that the greatest breadth should be considerably abaft the centre, &c.

The shaft of the paddle wheel, it is said, should be placed right over the abaft end of the greatest breadth of the vessel. The size and velocity of the paddle wheel, and also the length of the buckets are discussed; and the conclusion arrived at is that it will be advantageous to increase the velocity of the wheel, and to shorten the buckets in a proportionate degree.

The inverted arches are curved timbers which support the paddle wheel beams, and rest at their lower end against the keelson. The friction rollers are to be run under the wheel shafts.

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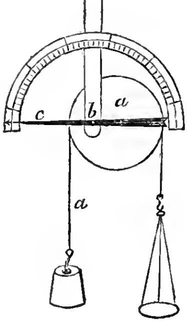
40. For an improvement in the *Balance;* Nereston Griffin, city of New York, April 8.



This contrivance is to operate very much upon the principles of the bent lever balance, as will be seen by the sketch in the margin, where *a* is a grooved wheel working eccentrically upon a pivot at *b*, and carrying an index *c*, the cord *d*, sustaining the weight and the scale; a further description we deem unnecessary. The claim is to "the application of the principle to any of the purposes for which scales or balances are used." When accurate weighing is required, this plan of a beam working on pivots, and subject to other disadvantages, will not supersede the ordinary mode of weighing, to which it is immeasurably inferior.

41. For *Cleaning and Polishing Rice;* M. Scarborough, Savannah, Georgia, April 8.

The claim under this patent "is the application of stone by itself, or with wood, or with any other material with which it, (the stone) can act in combination, together with the due and proper admixture of the chaff, to aid and promote the friction necessary and desirable for the proposed object."

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42. For a *Truss for Hernia;* Benjamin M. Smith, Tahlohnega, Lumpkin county, Georgia, April 14.

The pad plate of this truss is so constructed as to be operated upon by several springs, not admitting of verbal description. The pad itself is to be "a hard substance" which is to enter the hernial cavity, and with the assistance of a surrounding ring, is to produce "such a suppression of the cutaneous circulation as will promote the adhesion of the parts when irritated, and also tend to close the hernial cavity in such manner as greatly to accelerate the cure." The claims made refer to the particular arrangement by which the springs act upon the plates of the pads, and would not, therefore, be understood without the drawing. No particulars are given respecting the form, or variations therein, of the "hard substance" nor any directions relating to treatment as the cure advances.

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43. For a *Cooking Stove;* Thaddeus Fairbanks, St. Johnsbury Plains, Caledonia county, Vermont, April 14.

(See specification.)

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44. For *Tanning Hides;* John Lippincott and John Hillyer, Philadelphia county, Pennsylvania, April 14.

"The part believed to be new and claimed as an invention or improvement, is the plan of tanning *hides*, for the purpose before mentioned, by forming them into bags or sacks to contain the tanning matter, and applying pressure to force the tannin into the body of the hides, as hereinbefore mentioned.

"As it is believed that a process somewhat similar to the above has been adopted by others in tanning the skins of goats and other small animals, the inventors lay no claim to tanning skins on the foregoing plan, but confine their claim to such only as are usually called hides.

We should have supposed, that it was known to tanners that skins intended for morocco leather are generally, we believe uniformly, made into bags, and filled with the tanning liquor, and it is not to be imagined that because tanners technically apply to certain skins the name of hides, that a patent could be sustained on this technical distinction. But apart from this, several patents have been obtained, both here and in England, for tanning *hides*, by making them into bags, or confining their edges between frames, filling them with tanning liquor, and applying pressure either hydrostatically, or by a force pump. We will refer to one only, Peachy's, vol. 14, p. 41.

It has been fully proved that although the process can be thus very much accelerated, so that apparently good leather may be made in a few days, the test of wear has uniformly shown that the article thus made is of a very inferior quality.

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45. For machinery for *Cleaning and Blacking Boots and Shoes;* John Folsom, Hallowell, Kennebec county, Maine, April 14.

Round revolving brushes, such as were formerly much used for polishing, by brass workers, and others, are to be employed in cleaning and blacking boots and shoes. How often they have been so used we do not know, but we have heard them recommended to shoe blacks, forty years ago.

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46. For an improvement in *Tanning;* Isaac M. Belote, Fayette county, Tennessee, April 14.

The skins after being cleaned from the lime, are to be put into a vat, with liquid enough to cover them, which liquid is prepared by adding to water and a bushel of wheat bran added for every five hides, and allowing it to ferment; they are to be handled once a day for four or five days; after this they are to be immersed in ooze from Spanish, or chesnut, oak, in which they are to be handled twice a day for ten days, when they will be of a good colour.

A mixture is then to be made of half a pound of common salt, two ounces of ginger, and two ounces of alum, for a common size hide, and this is to be rubbed in on the flesh side; the hides are then to be bulked down for two or three days to allow them to absorb the materials. These operations are to be succeeded by a good bark for thirty days in the ooze used for colouring; this is to be twice renewed at the end of thirty days, by which time it is said that leather will be produced equal to that usually obtained by twelve months' tanning.

The claim "in the above described mode of tanning is to the application of *ginger*, together with salt and alum for hastening the process of the ooze." What good the ginger may produce, we cannot divine; salt and alum, have both been used in the tanning process.

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47. For an improvement in *Marine Railways;* Washington Van Duzen, Shipwright, Kensington, Philadelphia county, Pennsylvania, April 14.

The drawings would be required to show the particular form and construction of those parts of the marine rail way, upon which the patentee depends for the support of his claim, its general construction being similar to that known as Morton's.

The following is the claim: "The use of iron, or other metal, rollers, ormed as described, to work between the two sets of double rails, having connecting bars to confine the rollers to their stations. I do not claim the connecting bars, nor the use of rollers generally, they having been before known, but limit my claim under this head to the

particular kind of rollers shown in the drawings. The application of the screws in the uprights to the cradle bars. The application of the ratch wheels to act as a cog wheel upon the rack, as a substitute for chains the length of the carriage. The construction and application of the purchase bar, or lever for raising the vessel clear of the carriage, by means of the lifting screws and blocks. The mode of applying and relieving the spring falls which work upwards into the rack, affixed to the under or lower side of the carriage sill, all of which are described in the foregoing specification."

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48. For an improvement in the *Manufacturing of Hair Brushes;* Joseph B. Burgess, city of New York, April 14.

To enable the hair brush to penetrate through hair, however thick and matted, comb teeth are to be inserted in the stock with the bristles. The claim is to "the combination of the comb and the hair brush together, or rather the introduction of the teeth of the comb into the hair brush, thus uniting the efficacy and utility of two old instruments in the improved article now patented."

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49. For a *Family Grist Mill;* Peter M. Wright, city of New York, April 14.

"The claims made in this machine, and herein specified, are, together with its construction, the application of the crank spindle, working rod, and levers; the screwing of the damsel upon the head of the spindle; the manner of regulating and letting the flour into the bolt, and the conical form of the same."

It is not proposed to give great velocity to the runners of this mill, the patentee deeming this unnecessary for family use, and generally injurious to the flour. It is intended to have a crank upon the spindle of the runner, and to extend a pitman from this to a vibrating lever, having handles, by which a man may pull and push alternately. There are a number of figures in the drawing, representing the individual parts of the apparatus, and in the specification a great deal more of disquisition than of description; of the latter, however, there is enough, particularly in the references to the drawings.

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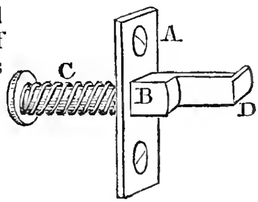
50. For *Machinery for Diminishing Friction;* Benjamin Hinkley, Fayette, Kennebec county, Maine, April 14.

This anti-friction machinery is the same which we have had to notice a great number of times, as, although it is about fifty years old, it still finds its way, every year or two, to the patent office as a novelty. Scarcely a school book, containing the elements of Natural Philosophy, appears without a cut of Garnet's friction rollers, and, in the present instance, we must in charity conclude that the impression made upon the mind of the boy has been retained with no more distinctness than has sufficed to make the man think himself an inventor.

51. For a *Window Spring and Bolt;* Marcus Merriman, Jr., New Haven, Connecticut, April 14.

This bolt does not differ, essentially, either in form or substance, from some other members of this numerous family, which were at one time as prolific as thrashing machines have been of late years. The bolt is to slide back into the window frame through an opening in a small plate screwed on for that purpose. A spiral spring surrounds a shank within the frame, and there is a thumb piece by which to press it in, and relieve it from the notches in the sash. All this occupies half a dozen pages of description, after which the patentee says, "I do not claim as my invention the spiral spring, or its application to window fastenings; both have been long known and used. But I do claim the more perfect and effectual application thereof, particularly in the form of the bolt and plate, and collar, and the simple combination of the several parts by which the spring, and bolt, and collar, above described, is made and inserted as above specified, and by which, new and beneficial results are produced. I also claim the elbow lever, thumb piece, and its application as above specified, and for these improvements, combined and separate, solicit letters patent."

That it may be clearly seen to what all this labour is devoted, we give a sketch of the machinery which is the subject of this patent.



A, is the front plate.
B, head of the bolt.
C, shank and spiral spring.
D, thumb piece.

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52. For a *Horse Power;* Webber Furbish, Hallowell, Kennebec county, Maine, April 14.

The horse is to walk upon an endless inclined plane, constructed like a host of others; but the patentee thinks that there is some novelty in the form of the links which constitute the chain, and claims this, "with the general arrangement and adaptation of the several parts of the machinery to effect the designed purpose." We cannot discover the novelty in the links, and assuredly there is not any in the "general arrangement," &c.

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53. For a *Machine for Dressing Feathers;* Orestes Badger, Otsego, Otsego county, New York, April 22.

(See specification.)

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54. For an *Elliptical Tin Reflector for Cooking;* Joshua Burch, Adams, Jefferson county, New York, April 22.

A tin reflector, "resembling an egg shell cut in two," is to be made two feet two inches long, one foot four high, and eleven inches deep. Within this is to be a sheet iron pan, to contain the articles

to be roasted, and there is to be a door at top for the convenient management of the operation.

"What I claim in the above reflector is its elliptical concave form, by virtue of which an almost infinitely diversified reflection of the rays of caloric is produced by and from the whole of every part of the interior surface."

This will undoubtedly be as good as some other "tin kitchens," but certainly no better; the advantages imagined to result from the elliptical form are theoretical deductions, which will not hold good in practice, from a diffused fire, and an uneven surface.

We have often been on the point of entering our protest against the term *caloric*, when substituted in common usage for the word heat. We have seen thermometrical observations headed "distribution of caloric," a usage of the expression which appears very much like the apeing of knowledge, whilst it manifests its absence. There is more *caloric* in the vapour of water at the freezing point, than there is in water at a boiling heat. Those to whom this is news, should not employ a term, of the value of which they are altogether ignorant.

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55. For an improvement in *Stoves and Grates;* Elkanah Ingalls, Providence, Rhode Island, April 22.

The improvement is designated in the claim, which is to "the application of horizontal sliding doors to stoves and grates of all descriptions," these being substituted for doors which open upon hinges. There are many stoves with sliding doors, some of which may be seen in the Patent Office; but they were known at an earlier date than any of those bear which are to be found there.

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56. For a machine for *Breaking Hemp and Flax;* Ferdinand Stith, Franklin, Williamson county, Tennessee, April 22.

This brake consists of two long horizontal frames, one under the other, the uppermost of which is stationary, whilst the lowermost is made to vibrate backward and forward by means of a pitman, operated upon by a crank. From the stationary, horizontal frame, descends four, or any other convenient number of, vertical frames, having slats at suitable distances crossing them from one side to the other of the machine. The lower, or movable frame, which traverses upon friction rollers, has an equal number of vertical frames rising from it, which are furnished with slats corresponding with, and working into, the spaces between the slats on the stationary frame.

The claim is to "the plan of running a brake in the horizontal manner, and so constructing it as to work one, two, three, four, or more, brakes at the same time, and in the same frame."

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57. For a *Floating Dry Dock;* Jonathan Hawes, Auburn, Cayuga county, New York, April 22.

This dock is described as though such a thing had never before been made, or thought of, there not being any one thing mentioned

as new, or claimed as invented by the patentee. It is to be a floating trunk, with gates at one or both ends to admit and enclose vessels, and pumps to discharge the water. We have described several such, and could refer to more, were it necessary to do so.

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58. For an improved *Rolling Machine;* Isaac Hinman, Hamden, New Haven county, Connecticut, April 22.

This rolling machine is constructed much in the manner of the common flatting mill; the rollers gear together at one end in the usual manner, and extend through the frame at the opposite end for the purpose of planishing, and otherwise operating upon, articles which cannot conveniently be passed through within the frame. It is proposed to forge, or roll, almost every variety of article, by means of dies fitted to the rollers.

"I claim as my improvement, the extension of the rollers to form a planisher on the frame; also the grooves, or gains, and corresponding followers on the rollers and shaft, for welding, shaping, and preparing materials; and also the dies, and the shaft for holding the dies, with all the apparatus thereof, as above described; and the mode, method, and process, of swaging of every kind, by means of dies of any description, operated upon by the power of rollers, as above specified and described."

There are but few things which would require a more limited claim than that of forging by means of rollers, a thing which has been extensively done, and patented under numerous modifications; yet we have, in the foregoing claim, what would seem to comprehend all things, past, present, and to come.

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59. For an improvement in the *Construction of the Joints of Carpenters' Rules;* Lemuel Hedge, Brattleborough, Windham county, Vermont, April 22.

This rule joint does not require the removal of any portion of the thickness of the legs of the rule to which it is applied. Two thin, flat disks of metal, perforated in the centre to receive a joint pin, are riveted one on each side of one of the legs, so that the joint pin shall coincide with the proper angle of the leg. These disks are then covered by two others, of a somewhat larger size, and having excavations into which the first named disks fit; the outer disks are then riveted to the corresponding leg, and a joint pin put through the whole.

"I claim as my invention, the manner of forming the joints of thin plates attached to the sides of the two legs, the intervening space being filled with the substance of the rule itself, instead of the more expensive mode of filling that space with metal."

This kind of joint will answer for the ordinary broad two foot rule, but not for those of a smaller and narrower kind; we, however, should much prefer a good joint made in the old way.

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60. For a *Balance, or Weighing Machine;* John G. Rohr,

assignee of the inventor, John B. Maag, city of New York, April 22.

Mr. Maag formerly obtained a patent for a platform balance, from which that now before us differs in the arrangement and connection of the levers; these particulars would require a drawing for their illustration, one being referred to throughout the specification.

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61. For *Pressing Tobacco, &c.;* Emanuel Shouvler, Richmond, Virginia, April 22.

It is stated that in the ordinary mode of flattening tobacco, and packing it in square boxes for exportation, two presses and sets of hands are employed, one to partially flatten, and the other to prize and finish, which operations the patentee performs by the aid of one press; to accomplish this, he has a square cast-iron box, with a movable bottom, attached, whilst pressing, by keys; this box is about twelve inches square, and five deep; the mode of manipulating is particularly described, but we cannot afford the room necessary to repeat the description. The claim is to the metallic apparatus, and the mode of using it.

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62. For *Kitchen Ranges,* both fixed and movable; Eliphalet Nott, Schenectady, New York, April 22.

There are eleven distinct particular arrangements, or combinations, claimed in this patent, which we cannot epitomize, and which, if given in full, without the drawings, would not be clearly understood.

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63. For improvements in the *Furnace, Boilers, and Chimney, of Steamboats;* Eliphalet Nott, Schenectady, New York, April 22.

"Whereas, inconvenience has arisen on account of the size of the ignited mass, where anthracite coal has been in use, when the pump, or other important machinery, has become deranged; therefore, an improvement has been made in the combination of the parts concerned, which consists,—

"In adjusting two boilers, or two groups of boilers, in such a manner as to leave sufficient space for the furnace between the two; and in closing up the ends, and springing an arch from the one boiler to the other, at the proper elevation, leaving therein a central aperture governed by a valve; and in adjusting the chimney immediately over said aperture; and in providing arch, or crotch, flues from the back of each boiler, or group of boilers, to the central chimney; and in piercing the crust of said flues on the back side, opposite the boilers; and in governing the aperture by valves; so that, by opening the same, and by opening also the valve at the bottom of the central chimney, combustion may, in case of accident, (by changing the direction of the current of air,) be suddenly checked, and the boiler cooled. For further information, reference may be had to the drawings and explanations connected herewith."

"I therefore claim as my invention and improvement, the combination of the boilers, furnace, flues, and chimney, so as to pass the air to, and the flame from, the boiler, in the manner and for the purposes aforesaid, or in any other manner preferred; and also the avoiding of the danger arising from a slab furnace by combining tubular boilers, whether the tubes be vertical or horizontal, with a brick furnace, together with the uses to which the same has been, or may be, applied."

Excepting in the claim, we do not find the combination of the tubular boilers in any way alluded to; as this is claimed, it ought to have been described.

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64. For a *Box Cook Stove;* Eliphalet Nott, Schenectady, New York, April 22.

"CLAIM.—I claim as my invention, each and all of the several improvements in said plate, or box, stove, and separate bake-oven; set forth in each and all of the above enumerated combinations, together with the uses," &c. The combinations alluded to amount to nine, to which the remark made under No. 62 will fully apply.

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65. For *Manufacturing Hoes;* Isaac Hinman, Hamden, New Haven county, Connecticut, April 22.

This patent is taken for the particular manner in which the patentee cuts the upper part of the plate from which the hoe is to be made, so as to bend over and weld to form the eye. The claim made is to "the method of forming the eye and the blade of the hoe from the same plate, without welding or riveting them together, and thereby enabling the manufacturer to make them from plates of a size and thickness suited to the kind he is making."

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66. For improvements in the *Printing Press;* John L. Kingsley, city of New York, April 22.

This is the common hand press, working by a toggle joint in a cast iron frame, and not differing in its general construction from those in use. The ends of the toggle joint, and the blocks or dies in which they act, are concave segments of spheres, and receive between them a cast-steel ball, which forms the joints; this, and the manner of making and putting together the frames, constitute the improvements.

"The first of material importance is the frame, the manner in which the casting of the frame, and the wrought iron rods, and the feet, are put together by the screws running through the feet, which is an entirely original plan, that makes the frame stronger, allows it to be lighter, and consequently to take up less room than others. The second part in which there is an improvement is in the works, the whole of which is entirely original. The cupped dies and levers with balls, or the bar and connecting rod, have never been in use before in any machine." "What I claim as my invention and not previously known in the above described machine, is every thing ex-

cepting the bed, platform and ribs; and their manner of connecting with the frame, and the connexions of these particulars."

Broad and sweeping as is the foregoing claim, we really see but very little in this press upon which to found any claim; so far as we can judge from the evidence before us, its peculiarity consists principally in matters of form, but not of substance.

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67. For a *Rotary Pump;* Isaac Hall, Poughkeepsie, Dutchess county, New York, April 22.

This pump is constructed upon the same principle with some others. It consists of an external cylinder, within which an interior cylinder revolves; there being a space between the two which forms the chamber. Two valves, one opposite to the other, shut into the interior cylinder, being inclosed by a stop, or an inclined plane within the chamber. A pin, or rod, passes through the internal cylinder, leading from one valve to the other; and when one is closed by passing the stop, this forces the pin against the opposite valve, and opens it. The improvement claimed is to "the moveable slide passing from one valve to the other, through the centre of the centre wheel, compelling one valve to open as the opposite valve is closed."

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68. For a *Substitute for dressed furs, or fur skins;* Allen Belden, city of Hudson, New York, April 22.

About six years ago several patents were obtained for manufacturing cloth without weaving, the fibres being united upon the principle of felting. In noticing these, we observed that the plan was not then new, having been carried into operation, and subsequently abandoned, both in Europe and in this country. In the specification before us we do not find any thing essentially different from what had been already known. The claim now made is not to any particular machinery, or new manipulation, but simply to "manufacturing a fur cloth or felting, in such a manner, of wool and fur combined, or entirely of fur, and of such size and shape as may be necessary in order to make a valuable and elegant substitute for most of the different kinds of fur skins and peltry now in use."

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69. For a *Machine for cutting Grain and Grass;* Abraham Randall, Verona, Oneida county, New York, April 22.

The difference between this and some other machines for reaping and mowing, is but small; the grain, or grass, passes in between blades projecting forward as it advances, which blades vibrate, and cut like scissors. The claim is to "the cutting of grain or grass with a double acting scissors, that cut both right and left, in the manner set forth; also the raking and discharging as described in the specification."

We are very apprehensive that a moving machine, with a long array of jointed scissors, will be found too complex for advantageous use.

70. For *Friction Boxes for the sheaves of blocks, &c.;* Lewis Aspinwall, city of Albany, New York, April 22.

The claim under this patent is to "the casting said articles in smooth metallic moulds, so as to need no subsequent finish, as my invention, and constituting the improvements herein specified;" *said articles* being the rollers and frame works for the friction bushes sometimes used in blocks. The process of casting in metallic moulds to furnish articles in cast-iron at once extremely hard, and true, is one well understood, and it may very fairly be doubted whether a patent can be sustained for casting a particular kind, or size, of rollers, &c. in a way perfectly well known, and therefore not properly coming under the denomination of an invention, or discovery.

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71. For an improvement in the *Looms for weaving figure work;* John Smith, Shafferstown, Lebanon county, Pennsylvania, April 22.

The improvement is principally in the parts which operate upon the draw boys, and from the pattern. We cannot offer any other description than that which the claim includes, as follows: "I claim as my invention the arrangement of that part of the loom first described, by which the shifters are drawn, instead of being forced back by the action of the pins upon the cylinder. I also claim the mode of connecting the lever which draws the shifters back, by which the cylinder is turned at the proper time and to the proper distance. I claim also the employment of two sets of gears in the same loom, in the manner described, by which it is adapted either to coarse or fine work. It is to be understood that I do not intend to claim the individual parts concerned in either of these operations, but only that general arrangement and connection of those parts by which new and useful effects are produced."

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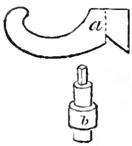
72. For an improvement in the manner of *Fastening Bedsteads;* Benjamin F. Berry, Utica, Oneida county, New York, April 24.



This is a new, and, we think, a good mode of fastening bedsteads, &c. together. A hook, of cast iron, five-eighths of an inch thick, two inches wide, and six long, is fastened into the post, by a dovetail and wedges, to the dotted line *a*; the hook part projects out, and passes into a notch in the rail, and the eccentric pin is inserted in a hole on the inside of the rail in such a way that the eccentric part acts upon the hook, and tightens the frame. The objection to the fastening is the projecting of the hook from the post to the distance of four inches or more, when the bedstead is down.

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73. For an improvement in the mode of manufacturing *Paris White;* Peter Ferris, Greenwich, Fairfield county, Connecticut, April 24.

The Paris white, or whiting, according to the process of the pa-

tentee, is to be made by dry grinding the material from which it is formed, instead of grinding it as usual, in water; he states that when thus made it is worth from 10 to 25 per cent. more than that ground in water. This may be the case for some purposes, but we know that much of the whiting which is manufactured is not fit for the gilders' use unless it has been well washed, in order to separate from it the silex that is almost always contained in chalk; probably the patentee may use the Agaric mineral, but this he does not mention.

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74. For a *Churn;* Samuel Clark, Parkman, Somerset county, Maine, April 24.

This churn is an oblong box, hung upon gudgeons, and worked by vibrating it. The claim is to "the manner of hanging it, and its operations and ways." If the patentee was the first inventor of this contrivance, he is no stripling.

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75. For *Blocking Hame Collars;* Milvern Eddy, Adams, Jefferson county, New York, April 24.

Four or five patents were obtained a few months since for blocking horse collars, by means of a screw, instead of which the present patentee employs a windlass. The apparatus employed is described at great length, and the following claims are made.

"First. The drawing of the rope round the collars by means of a windlass, or wheel and axle.

"Second. The dividing of the block crosswise into two parts, and making the large end of the block moveable by a screw, or by a windlass, or wheel and axle.

"Third. The wings upon the sides of the block, to keep the collar in proper shape, &c."

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76. For a *Revolving Cheese Shelf;* Henry Weber, East Richfield, Otsego county, New York, April 24.

A series of shelves is placed in a frame, one shelf above the other, and this frame has gudgeons on the centre at each end, allowing the whole to be inverted at once when the cheeses are to be turned. The cheeks of the frame to which are attached the cleats that support the shelves are divided on each side so as to leave a space between them equal to one half of the width of the end, and this space is occupied by the ends of a second frame which is capable of sliding within the other, and of carrying the same number of shelves. A kind of windlass is used to slide this second frame up and down when the cheeses are to be turned. For this purpose the secondary frame is lowered so as to embrace the cheeses between its shelves, and those of the first frame, which is then inverted, slats on one side preventing the slipping out of the cheeses. The shelves may then be separated by means of the windlass. The claim is to the compressing the cheeses between the two sets of shelves in the manner, and for the purpose, above described.

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77. For a *Thrashing Machine;* James Whitehall, Frederick county, Maryland, April 24.

We cannot find room even for the whole claim to this thrashing machine, but will give the commencement as a specimen. "What I claim as my own invention and not previously known in the above described machine is as follows: The cylinder two feet eight inches long, sixteen inches in diameter, with a wrought iron axle two inches square, neatly turned off where it rests on the boxes," &c., &c. &c. through a whole page of novelties of the same character. We are told at length that this "differs from all other machines now in use in not having teeth in the concave, and has but one feeding roller, that may be dispensed with if necessary. And it further differs from other machines in the small number and peculiar formation of the teeth, which gives not only an increase of power, but also thrashes grain without the use of the feeding rollers, if dry."

To know "all other machines in use" is a great extent of knowledge; we have examined a few scores of thrashing machines without having acquired it, although in so doing we have met with many "not having teeth in the concave."

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78. For a *combination of the lever, the crooked shaft or crank, the weights, and the balance wheel, by which to propel machinery;* E. T. Merrill, Parkman, Somerset county, Maine, April 24.

After a description involved in clouds and darkness, if a thing so involved may be called a description, the patentee claims "this combination of the lever, the crooked shaft or crank, the weights, and balance wheel, to propel machinery, and gain a starting point for the same." We greatly err, or the contriver has not his balance wheel in the right place, and we really believe that if he ever propels machinery he must find a new "starting point for the same."

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79. For a *Straw Cutter;* John W. Cope, Franklin county, Tennessee, April 24.

The straw to be cut is put endways into a hopper, in which it is to descend by its own gravity. A sliding frame carrying an oblique knife, with two cutting edges, traverses backwards and forwards under the hopper, being moved by a pitman from a crank shaft, regulated by a fly wheel. There is no claim made, but this had been already done in at least one of the ten straw cutters patented in 1833, several of which resemble that now under consideration; we do not think it necessary to turn to the particular one which is its counterpart.

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80. For a *Bee Hive;* Orlando Marks, Gilrum, Cheshire county, New Hampshire, April 24.

Those who have made themselves acquainted with the different modes of constructing bee-hives will perceive at once, from the nature of the following claim, that there is not any novelty whatever in the thing proposed to be done, nor do the described means of carrying the intention into effect differ in any essential particular from such as have been previously employed.

"What I claim as my invention is the mode of constructing a bee hive, with apartments in such a manner as, by the use of a slide, to shut the bees from different apartments, and thereby take out the honey at any time without killing the bees. Also the construction of an iron hoop attached to the bottom of the hive so as to prevent the bee miller, or moth, from getting into the hive."

The iron hoop alluded to in the latter part of the claim surrounds the hive at its lower end, and constitutes the edge upon which the hive rests upon the bench, or table. As this is considered a very important thing, and, if effectual in its operation, is really so, it ought to have been distinctly explained in the drawing, as the verbal description given is not very clear. We are told that "the lower edge of the hoop must set tight down to the bench, or form, then the bees may go through the space in the hoop, and there is no chance for the bee moth, or miller, to lay his nits under the edge of the hive."

SPECIFICATIONS OF AMERICAN PATENTS.

Specification of a Patent for an improvement in the Mode of Constructing Stoves for Cooking, and for Warming Apartments. Granted to THADDEUS FAIRBANKS, *St. Johnsbury Plains, Caledonia county, Vermont, April* 14, 1835.

To all whom it may concern, be it known, that I, Thaddeus Fairbanks, of St. Johnsbury Plains, in the county of Caledonia, and State of Vermont, have invented certain improvements in the mode of constructing stoves for cooking, and for warming apartments, and that the following is a full and exact description thereof.

The stove upon which my improvements are made, is of the kind known in many places under the name of the "diving stove," and which is so called in consequence of the draft being directed downwards from the fire, before the smoke and heated air make their exit through the ordinary pipe. This stove is best adapted to the burning of wood, and may be made either square or oval, having the general form of the common ten plate stove. The upper part of the stove forms the fireplace; beneath this is the oven, the lower plate of which constitutes the upper part of a flue, formed between it and the bottom plate of the stove. The door for the supply of fuel is best made at one end, the diving, or descending flue, which leads to that below the oven, being at the other. A plate rises at the rear end of the fireplace, forming its back, its upper edge terminating at a sufficient distance below the top plate to allow the flame and smoke to pass over it into the back flue. Openings are made through the top plate to receive cooking utensils.

The rising flue, leading from the lower flue to the stovepipe, I form by making an opening from the said lower flue through the side plate of the stove, near to its front end, which opening is covered by a curved plate, leading from the bottom to the top of the stove, where this rising flue connects with the common stove pipe. I generally

give to the curved plate, forming the rising flue, an inclination towards the back end of the stove, so that it may terminate, and connect with the pipe at about the middle of the side plate. This rising flue, formed by the curved plate, as above described, constitutes one of my improvements.

It is sometimes desirable to allow the draft to escape directly from the fireplace into the flue, without passing down behind and under the oven. To effect this, I make an opening from the fireplace, through the side plate, into the flue, and to this I adapt a valve, or damper, which, when opened, allows of this direct escape, and, when closed, guides the draft underneath the oven. This constitutes my second improvement.

What I claim, therefore, as my invention, is the before described rising flue, formed by the curved plate, combined with the valve, or damper, operating in the way, and for the purposes, described; not intending to claim, in any form or manner, the general construction of the stove with a diving flue, nor any of the individual parts that I have described, with the exception of that which I have above designated as constituting my improvement.

THADDEUS FAIRBANKS.

Specification of a Patent for an improved Machine for Cleaning and Dressing Feathers. Granted to ORESTES BADGER, *Otsego, Otsego county, New York, April* 22, 1835.

To all whom it may concern, be it known, that I, Orestes Badger, of Otsego, in the county of Otsego, and State of New York, have invented an improved machine for cleaning and dressing feathers. And I do hereby declare that the following is a full and exact description thereof.

The machine may, of course, vary in its dimensions, according to the quantity of feathers which are to be acted upon at one operation; the measurements, therefore, which I may indicate, are only to be considered as relative, and belonging to one of ordinary size.

I make a box, or receptacle for the feathers, of sheet iron. This box may be six feet long, two feet six inches wide, and three feet deep; its lower half constitutes a semi-cylinder, placed horizontally, and above this part the sides may rise vertically. A reel, or revolving rake, is placed within this box, so that rows of teeth, or pins, placed upon it, shall come nearly in contact with its cylindrical bottom, and stir up the feathers; one of the gudgeons of the shaft passing through the end of the box, to communicate the requisite motion to it. The cover of the box may consist of cloth, stretched upon a suitable frame. The bottom of it is to be punched with numerous holes, to admit of the passing of heated air into it, and to allow of the escape of the dust separated from the process of dressing. ti nhe feathers

Immediately beneath the before described box, I place stoves, or flues, which may be fed with fuel through suitable openings at each

end of the machine; these stoves, or flues, are so arranged as to distribute the heat as equally as possible under every part of the box; and to intercept its direct, or too powerful action, plates of metal are placed between the upper side of the flues, and the bottom of the box. A depth of about a foot may be allowed for these stoves, or flues.

A frame, or rectangular box of wood, is made to enclose the parts described. The interior of this box I line with sheet iron, or, in preference, with tin plate. The wood, being a bad conductor of heat, will prevent its dissipation, and the absence of brickwork about the fire will leave the apparatus sufficiently light to render it altogether portable, and constantly ready for use.

For the purpose of discharging the feathers, I divide the wooden box into two parts, at or near its middle, horizontally, and hinge these parts together on one side, by which arrangement the feathers, when dressed, can all be emptied out, by turning the upper part over.

When feathers are to be dressed, I put them into the beforenamed receptacle, and pour, or sprinkle, over them a small portion of water, and, when the fire has been lighted in the stove, keep the feathers in constant motion by turning the revolving reel, or rake. As the water evaporates, the feathers will become perfectly lively, and the dust will be separated from them, so as to render them clean; a previous washing being rarely, if ever, found necessary.

What I claim as my invention, is the constructing of a machine for dressing and cleaning feathers, furnished with a box, or receptacle, such as I have described, and in which they are stirred up, or agitated, by the revolution of a reel, or rake, in the manner set forth. I also claim the enclosing of the stoves, or flues, within a wooden box, lined with metal, and the holes for the admission of heated air, and the discharge of dust through the bottom of the receptacle. I also claim the constructing of the wooden box, or frame, in such a manner that the whole of the dressed feathers may be discharged therefrom at once.

Orestes Badger.

Specification of a Patent for an Improvement in the Wheels for Locomotive Engines and Cars, for Rail-roads, and in the Tubes for the Boilers of Locomotive Engines. Granted to Matthias W. Baldwin, *Civil Engineer, city of Philadelphia, April 3d,* 1835.

To all whom it may concern, be it known, that I, Matthias W. Baldwin, machinist, of the city of Philadelphia, in the State of Pennsylvania, have made certain improvements in the wheels, and in the boiler tubes, of locomotive engines, for rail-roads, which improvements, so far as the wheels are concerned, are applicable to rail-road cars, also; and that part which appertains to the tubes of boilers, is applicable to all steam engine boilers in which such tubes are em-

ployed; and I do hereby declare that the following is a true and exact description of my said improvements.

It is well known to engineers upon rail-roads, that in running upon iron tracks, the wrought tire forming the tread of the wheel, when the wheel is altogether of iron, is gradually stretched, and becomes loose; to prevent this, rims of wood have been interposed between the tire, and the rim of a cast-iron wheel; but I have invented an improved mode of interposing wood, which, whilst it is more simple than the plans heretofore adopted, is equally efficacious, and secures certain other advantages not attained by the methods alluded to.

I cast the hub and spokes of the wheel of common soft iron, without a rim; but the spokes have projections on their outer ends, forming sections of a rim, such as would be produced by casting it with a flat rim, and afterwards dividing this by cutting out a piece therefrom, two or three inches wide, midway between each spoke; these projections form suitable bearings within the rim, by which the spokes are to be surrounded. It will be perceived that in making such a casting, the hub may be made solid, and without bands. The rim may be made in various ways; that is, it may be entirely of cast, or entirely of wrought, iron; or it may be in part of cast-iron, with a wrought iron tire; I intend, in general, however, to make the rim of cast-iron, chilled in the usual manner, by which means the strain which always exists when the spokes and rim are cast together, will be prevented; but the main object in view is the interposing between the spokes and the rim, a layer of wood, or other substance possessing a similar degree of elasticity; for this purpose, the spokes are cast of such length as will admit of its introduction, leaving a space between their ends and the interior of the rim, say of one inch, more or less.

To attach the spokes and the rim to each other, I cast the rim with a flanch on one side, projecting inwards, so as to form a bearing for the projecting ends of the spokes, when the two parts are put together; screw bolts are then passed through the ends of each spoke, and though the flanch, by which means they are firmly united to each other.

The pieces of wood between the spokes and the rim may be secured to their places in various ways, as, for example, the projecting ends of the spokes may be made flat, so that the pieces of wood will also be flat on the side which bears upon them, and curved where they bear upon the interior of the rim; this will prevent all tendency to motion endwise, whilst there may be a projecting fillet upon the end of the spoke to check them sideways; there may, also, be a plate cast separately from the spokes, through which the screw bolts may pass, so as to draw them down firmly upon the wood, to confine it in its place. The drawing deposited in the patent office will illustrate these methods; but, without this, a competent workman would find no difficulty on this point. A hub and spokes, cast in this way, may serve for many rims, and these latter may be renewed without the necessity of taking the arms from the axles.

The plan now pursued of putting the tubes, which serve as flues, into the boilers of locomotive engines, is to pass them through the

heads of the boilers, and then to drive ferules, or thimbles, as they are called, into each end of the tube; this, of course, diminishes the size of the tube at each end, causing them to become obstructed more readily by coals, soot, and dust, and rendering it more difficult to clean them out than would be the case, were they of equal size throughout.

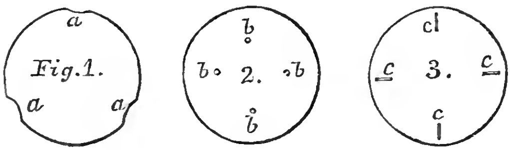
To obviate this difficulty, I drive the ferule, or thimble, on to the outside of the projecting ends of the tube, and solder them in their places, by this means rendering the tubes much stronger than they are in the former way, and leaving them of the same diameter throughout.

What I claim as my invention in the apparatus herein described, is the introduction of wood, or other substance similar in elasticity, between the ends of spokes, separated from each other, and the interior of the rim of a wheel, in the manner, and for the purpose, herein set forth; I also claim the securing of the ferules, or thimbles, upon the outsides of the ends of tubes passing through boilers, as above specified and described.

MATTHIAS W. BALDWIN.

ENGLISH PATENTS.

Specification of a Patent granted to RICHARD WALKER, *manufacturer, for an Improvement in Wadding for Fire-arms. Sealed 26th June,* 1834.



This invention consists in the application of metallic disks, (having apertures for the passage of air,) for the purpose of wadding for fowling-pieces, and other fire-arms. Fig. 1 represents a circular disk of metal, which is made to the size required for the bore of the intended fowling piece, and in such a manner as to touch the barrel all round, except at the parts *a*, *a*, which are apertures, or openings, through which the air in the barrel passes, when wadding is rammed down. Fig. 2 is another disk, having holes at *b*, *b*, in place of the apertures, *a*, *a*, which are cut out at the outer edges in fig. 1; and fig. 3 represents another disk, having short slits at *c*, *c*, instead of the apertures in figs. 1 and 2, at *a* and *b*. It will be evident that it is not material what may be the shape or form of the openings, or aper-

tures, care always being taken that they are not made large enough to admit of the escape of the powder. Various advantages may be derived from the application of these metallic disks as wadding, for the purposes of sporting, instead of the wadding commonly used. Amongst other advantages will be the great compactness of the charge, in consequence of the close contact of the powder to the shot. It may also be desirable to observe, that in ramming down the metallic wadding, the interior of the barrel will be materially cleansed after each successive discharge. The patentee here observes, that he usually makes the above described metallic wadding by means of the ordinary fly-press, and that he generally makes the disks from plate or sheet brass, (such brass being tinned,) from one hundred to one hundred and twentieth of an inch in thickness.

The patentee further remarks, that although he prefers brass, he does not intend to confine himself to that metal, because other metals, or compounds of metals, may also be made to answer the same purpose; care being taken that whatever metal is used for that purpose, its hardness shall not be such as to prevent the worm or screw of an ordinary ramrod from easily passing through it, whenever it may be necessary to withdraw the charge; and it is also desirable that, whatever metal may be used for that purpose, it should possess such a degree of elasticity, that, should the disk or wadding be in the smallest degree larger than the bore of the barrel, it may offer such a resistance as to retain itself securely in the place to which it is forced by the ramrod; it may also be desirable to remark, that lead should not be used, owing to its want of that degree of elasticity above described, but more particularly as it would add to that effect (called leading) usually produced by the shot when a fowling-piece is discharged, and which this improved wadding has a great tendency to remove.

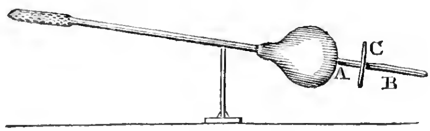
The patentee concludes by saying, that he confines himself to the application of metallic disks, (having suitable apertures for the passage of air,) for wadding for fowling-pieces, and other fire-arms, as above described.

Specification of the Patent granted to JAMES *and* JOHN HARTLEY, *Glass Manufacturers, for a certain Improvement, or certain Improvements, in the Manufacture of Glass. Sealed October* 22, 1834.

To all to whom these presents shall come, &c. &c., Now know ye, that in compliance with the said proviso, we, the said James and John Hartley, do hereby declare the nature of our invention, and the manner in which the same is to be performed and carried into effect, are fully described and ascertained in and by the following description thereof, reference being had to the drawing hereunto annexed, and to the letters and figures marked thereon, (that is to say:)

Our invention relates to part of the process employed in the manufacture of that description of glass called crown glass, used for the

purpose of glazing windows, and other purposes. It is well known that this description of glass is produced from the metal by blowing the same into the form of globes, and afterwards, by means of the operation called "*flashing*," such globes are thrown open into flat circular plates, called tables. Now, our invention relates to that part of the process of manufacture which consists in blowing the metal into globes. According to the ordinary process, the metal, when taken from the pot by the pipe, is rolled on a smooth iron surface, in order to bring the outer end of the metal to a conical form, the extreme end of which becomes the outer axis of the globe during the operation of blowing and working the glass into the required form. This outer axis is called the bullion. During the expanding of the metal into the globular form, the workman rolls the bullion along a straight edge, or bar, called the bullion bar, as is well understood. In doing this, the outer end of the glass globe, whilst expanding, and continually revolving, rubs against the bullion bar, by which action parts of the surface of glass are disturbed, or made irregular, and as the globe extends in dimensions, this rubbed surface enlarges; the consequence is, that when the table of glass is complete, there are at all times more or less waved lines for some inches around the bullion, or the centre of the table of glass, which lessens the value of so much of the table. This prejudicial appearance is produced to the glass, as before stated, by that part of the surface coming in contact with, and rubbing against, the bullion bar, when the metal is in a soft and pliant state. Now, the object of our invention is to dispense with the bullion bar, and to supply its place by the application of a tube, or hollow bearing, for the bullion, or outer axis, of the globe of glass, during the expansion of the same; by this means, that part of the surface which was heretofore rubbed against the bullion bar, is, when worked according to our invention, in no way prejudicially acted on, and the waved appearance before consequent on the manner of operating, is avoided.



Description of the Drawing,

Which represents an ordinary pipe with a globe of glass, the bullion, A, being supported by the tube, B, in which it is caused to revolve by the workman when working the metal into the globular form desired during its expansion. On the tube, B, is placed a shield, C, which is intended to prevent the heat, coming from the heated glass, injuring the hands of the boy who holds the tube. The workman, in performing this part of the process of manufacturing glass, takes a proper quantity of metal on the end of the pipe, and proceeds to form the outer end of such metal into a cone; he proceeds with the process in like manner to that heretofore pursued, till the globe of glass requires

support at the outer end by its axis, or bullion, A; that is to say, he proceeds in the ordinary manner up to the period at which (according to the old means of operating) the bullion would have been rested on, and revolved, and run along the bullion bar; but, in place of so running it along the bullion bar, a boy holds the tube, or hollow bearing, B, in such manner as to receive the bullion, A, and the workman causes the globe to revolve till the globe is sufficiently expanded. The same is then to undergo the operation of flashing, as heretofore.

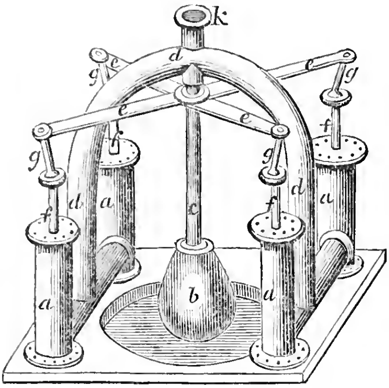
Having thus described the nature of our invention, and the manner of carrying the same into effect, we would have it understood that our invention consists in the application of the tube, or hollow axis, B, in place of running the bullion along the straight edge called the bullion bar, as above described. [*Rep. Pat. Inv.*

Specification of the Patent granted to John Barton, *Engineer, for his Improvements in the Construction and Application of Pumps, and Machinery for raising Fluids, and other purposes. Sealed June 1st*, 1833.

The object of the patentee is to avail himself of the rolling and pitching motion of a vessel at sea, and to apply that motion as a moving power to actuate pumps on shipboard, in order to raise the bilge water from the hold, instead of employing manual labour for that purpose.

The patentee says that his invention "consists in certain arrangements of apparatus and machinery, whereby he is enabled to take advantage of any vibration which may be produced to the body, or apparatus, or vessel, in which his improvements are placed, and thereby produce to the pump, or pumps, a constant working action. For instance, in a ship, or vessel, whether sailing, or laying at anchor, there will at all times be produced more or less action to the pumps on board, when constructed and applied according to my improvements." He goes on to say, "my invention consists in so suspending or connecting a weight, or weights, to the piston rods of pumps, that in whatever direction an inclination may take place, such weight, or weights, from their being able to act in any direction, will cause a working motion to the pumps; and it is to the giving a universal power to such weight to turn to their work, in whatever direction the inclination or oscillation may take place, which constitutes my patent improvements."

This will be understood by reference to the annexed figure, which represents, in perspective, four pump barrels, *a*, *a*, *a*, *a*, placed at equal distances apart, with a ponderous weight, *b*, attached to a pendant rod, *c*, in the middle, the top of the pendant rod being connected by a ball and socket joint to the standard, *d*, *d*. Near the top of the pendant rod, cross arms, *e*, *e*, *e*, *e*, are affixed; and the piston rods, *f*, *f*, *f*, *f*, of the pumps, are severally connected by small rods, *g*, *g*, *g*, *g*, having universal joints to the ends of the cross arms, *e*, *e*, *e*, *e*.



It will hence be perceived that any motion of the vessel in which this apparatus is placed, will cause the pendant weight, *b*, to oscillate, thereby giving an undulating movement to the cross arms; and these arms raising or depressing the pistons of the pumps, to which they are attached by rods with ball and socket joints, will cause the water to be raised up the suction pipes, shown by dots, and be thence forced along the horizontal pipes, *h*, *h*, and up the standard pipes, *d*, *d*, to the discharging aperture, *k*, at top.

The patentee says, in conclusion, "Having now described the nature of my invention, and the manner of combining and using the same, I would have it understood that I am aware that a weighted pendulum has been already used for actuating pumps, but it has only been capable of swinging or vibrating in one direction, consequently, was of no use in situations where the vibration or oscillation is continually changing its direction. I do not, therefore, lay any claim to a weighted pendulum working in such manner; but I claim the giving a universal property to turn in any required direction to a weighted pendulum actuating pumps, whereby, in whatever direction the vibration or inclination may take place, the said weighted pendulum, or other similar apparatus, may be able to turn in that direction, and work the pump, or pumps. And I would here observe, that although I have only described an arrangement of four pumps, it will be evident that similar effects may be produced to one or more pumps."

[*Lond. Jour.*

Bibliographical Notices.

Elements of Chemistry, including the recent discoveries and doctrines of the Science, by Edward Turner, M. D. &c. &c. &c., Fifth American, from the fifth London edition, with notes and emendations. By Franklin Bache, M. D. &c. &c. (Desilver, Thomas & Co.)

The student of chemistry will hail with pleasure a new edition of this popular work. The author and editor are mutually fortunate; the former to have so excellent an editor, the latter to have so good a work to edit.

It appears to have been the study of Professor Turner to incorporate into his new edition, the discoveries and theories which every day brings to light. In certain parts of the science this has been done by re-writing entire sections, and even chapters. Thus conside-

rable additions have been made to the chapter on light; that on electricity has been almost re-written, as well as that on galvanism. If this were the place to do so, fault might be found with the historical part of the sketch of magnetism and electricity, from which, as Americans, we must dissent. To continue our remarks: judicious alterations have been made in the section on the laws of combination. The use of chemical symbols has been introduced. The departments of organic chemistry revised and much changed. The chemical notation adopted is that of Berzelius, which, if we mistake not, requires all the advantages of extensive use and compactness, to compensate for the difficulty with which the transformations are effected in it. The author has obviously turned to profit the notes and suggestions of the American editor, and indeed acknowledges that he is thus indebted to him.

The American edition has been so carefully revised, that, we doubt not, with the Editor, that "the American edition will be found much more correct than the London work."

The Scientific Class Book, or a familiar introduction to the principles of Physical Science, for the use of schools and academies, on the basis of Mr. J. M. Moffat, with emendations, &c. By Walter R. Johnson, A. M., *Professor of Mechanics and Natural Philosophy, in the Franklin Institute, &c., &c.,* Part I. (Philad., Key & Biddle, 1835.)

This volume of the esteemed work of Mr. Moffat has been improved for use, both by teachers and their pupils, by the questions of the American editor placed at the foot of each page, and the work has thus been adapted to use in schools and academies. As a popular exposition of the various subjects embraced, this work is of considerable interest, and has lost nothing by the adaptation to which we have just alluded, while its accuracy has been increased in the hands of the American editor. The subjects embraced in this first part of the work are Mechanics, Hydrostatics, Hydraulics, Pneumatics, Acoustics, Pyronomics, Optics, Electricity, Galvanism, and Magnetism. The lists of works for reference will be found of value even to the more advanced student in these various branches.

¶ *Manufacture of Wool.*

There can be no doubt that the arts of spinning wool, and manufacturing the yarn into cloth, were introduced into England by the Romans, the inhabitants being previously clothed only in skins. From the period of the Romans quitting England, down to the 10th century, there are no notices of the manufacture; and those relating to the period from the 10th to the 13th century are but few and imperfect. It is certain however, that the manufacture of broad cloths was established soon after the year 1200, if not previously. *(Smith's me-*

moirs of Wool, vol. i. p. 17.) But the woolen manufactures of Flanders being at this period, and long afterwards, in a comparatively advanced state, English wool was exported in large quantities to Bruges and other Flemish cities, whence fine cloths and other products were brought back in exchange. Edward III. took the most judicious measures for improving the English manufacture, by inviting over Flemish weavers, fullers, dyers, and others, and protecting them from the assaults of the rabble. Shortly after the first emigration of the Flemings, or in 1337, an act was passed, prohibiting the wear of any cloths made beyond seas, and interdicting the export of English wool.—*(Ibid.* vol. i. p. 25.) But in these turbulent times such restraining acts were little better than a dead letter; and this, indeed, was soon after repealed. —*(Ibid.* vol. i. pp. 32, 39.*)* From this remote period the manufacture has always been regarded as of primary importance, and has been the object of the especial solicitude of the legislature. It may be doubted, however, whether it has derived any real advantage from the numberless statutes that have been passed in the view of contributing to its advancement. With the exception, indeed, of the prohibition of the export of English wool, which was finally put a stop to in 1660, the other acts, being mostly intended for the regulation of the manufacture, could not be otherwise than mischevious; and the benefit derived by the manufacturers from the prohibition was more apparent than real; inasmuch as it occasioned a diminished growth of wool, at the same time that it was impossible to prevent its clandestine exportation. Mr. Smith has proved that the manufucture made a far more rapid progress during the reign of Elizabeth, when wool might be freely carried out of the kingdom, than it ever did during any equal period subsequent to the restriction on exportation. Foreign wool began to be imported in small quantities in the 13th century.

At first the manufacture seems to have been pretty equally distributed over the country. In an insurrection that took place in 1525, more than 4,000 weavers and other tradesmen are said to have assembled out of Laneham, Sudbury, and other towns in Suffolk. The manufacture had been previously introduced into Yorkshire. In 1533, an act was passed (34 & 35 Hen. 8. c. 10), reciting "that the city of York afore this time had been upholden principally by making and weaving of coverlets, and the poor thereof daily set on work in spinning, carding, dyeing, weaving, &c.;" that the manufacture, having spread into other parts, was "thereby debased and discredited;" and enacting, as a remedy for this evil, that henceforth "none shall make coverlets in Yorkshire, but inhabitants of the city of York!" This may be taken as a fair specimen of the commercial legislation of the time. Indeed, it was enacted, nearly at the same period, that the manufacture should be restricted, in Worcestershire, to Worcester and four other towns. Worsted goods, so called from Worsted, now an inconsiderable town in Norfolk, where the manufacture was first set on foot, were produced in the reign of Edward II., or perhaps earlier; but Norwich soon after became, and notwithstanding the competition of Bradford, probably is still, the principal seat of

this branch of the manufacture. In an act of Henry VIII. (33 Hen. 8. c. 16.), worsted yarn is described as "the private commodity of the city of Norwich." In 1614, a great improvement took place in the woolen manufacture of the west of England, by the invention of what is called medley or mixed cloth, for which Gloucestershire is still famous. During the reign of Charles II., there were many, though unfounded complaints of the decay of the manufacture: and by way of encouraging it, an act was passed (30 Car. 2. st. i. c. 3), ordering that all persons should be buried in woolen shrouds! This act, the provisions of which were subsequently enforced, preserved its place in the statute book for more than 130 years!

Towards the end of the 17th century, Mr. Gregory King and Dr. Davenant—(*Davenant's Works*, Whitworth's ed. vol. ii. p. 233.)—estimated the value of the wool shorn in England at 2,000,000*l.* a year, and they supposed that the value of the wool (including that imported from abroad) was quadrupled in the manufacture; making the entire value of the woolen articles annually produced in England and Wales, 8,000,000*l.*, of which about 2,000,000*l.* were exported. In 1700 and 1701, the official value of the woolens exported amounted to about 3,000,000*l.* a year. Owing to the vast increase in the wealth and population of the country, the manufacture must have been very greatly extended during the last century; but the increase in the amount of the exports was comparatively inconsiderable. At an average of the 6 years ending with 1789, the annual official value of the exports was 3,544,160*l.* a year, being an increase of only about 540,000*l.* on the amount exported in 1700. The extraordinary increase of the cotton manufacture soon after 1780, and the extent to which cotton articles then began to be substituted for those of wool, though it did not occasion any absolute decline of the manufacture, no doubt contributed powerfully to check its progress. In 1802, the official value of the exports rose to 7,321,012*l.* being the largest amount they ever reached till last year, when they amounted to 7,777,952*l.* During the last 3 years, indeed, every part of the manufacture has been in a state of unexampled improvement and extension. It is probable that the extraordinary rise in the price of wool may give a temporary check to the manufacture; but it cannot be of long continuance. During the five years ending with 1833, the official and the declared or real value of the woolen manufactures exported from the United Kingdom have been as under:—

	1829.	1830.	1831.	1832.	1833.
	£	£	£	£	£
Official value of woolen manufactures exported,	5,372,490	5,558,709	6,097,558	6,544,576	7,777,952
Declared or real val. of do.	4,661,259	4,850,884	5,227,701	5,239,992	6,289,649

Value of the Manufacture. Number of Persons employed.—The most discordant estimates have been given as to both these points. For the most part, however, they have been grossly exaggerated. In a tract published in 1739, entitled *Considerations on the Running* (Smuggling) *of Wool*, the number of persons engaged in the manufacture is stated at 1,500,000, and their wages at 11,737,500*l.* a year.

Dr. Campbell, in his *Political Survey of Great Britain*, published in 1774, observes,—"Many computations have been made upon this important subject, and, amongst others, one about 30 years since, which, at that time was thought to be pretty near the truth. According to the best information that can be obtained, there may be from 10,000,000 to 12,000,000 sheep in England, some think more. The value of their wool may, one year with another, amount to 3,000,000*l.*, the expense of manufacturing this may probably be 9,000,000*l*,, and the total value 12,000,000*l.* We may export annually to the value of 3,000,000*l.*, though one year we exported more than 4,000,000*l.* In reference to the number of persons who are maintained by this manufacture, they are probably upwards of 1,000,000. Sanguine men will judge these computations too low, and few will believe them too high."—(Vol. ii. p. 158.) But the moderation displayed in this estimate was very soon lost sight of. In 1800, the woolen manufacturers objected strenuously to some of the provisions in the treaty of union between Great Britain and Ireland, and were allowed to urge their objections at the bar of the House of Lords, and to produce evidence in their support. Mr. Law (afterwards Lord Ellenborough), the counsel employed by the manufacturers on this occasion, stated, in his address to their Lordships, on information communicated to him by his clients, that 600,000 packs of wool were annually produced in England and Wales, worth, at 11*l.* a pack, 6,600,000*l.*; that the value of the manufactured goods was three times as great, or 19,800,000*l.*; that not less than 1,500,000 persons were immediately engaged in the operative branches of the manufacture; and that the trade collaterally employed about the same number of hands.—(*Account of the Proceedings of the Merchants and Manufacturers*, &c. p. 34.)

It is astonishing that reasonable men, conversant with the manufacture, should have put forth such ludicrously absurd statements. We have already seen that the quantity of wool produced in England and Wales in 1800, did not really amount to 400,000 packs; and the notion that *three* out of the *nine* millions of people then in the country were directly and indirectly employed in the manufacture, is too ridiculous to deserve notice, though it was generally acquiesced in at the time.—(*See Middleton's Survey of Middlesex*, 2d. ed. p. 644; *Adolphus' Political State of the British Empire*, vol. iii. p. 236.)

Mr. Stevenson, who is one of the very few writers on British statistics to whose statements much deference is due, has given the following estimate of the value of the woolen manufactured goods annually produced in England and Wales, and of the interest, &c. of the capital, and the number of persons employed in the manufacture:

Total value of manufactured articles, . .		£18,000,000
Value of raw material, . .	6,000,000	
Interest on capital, sum to replace its wear and tear, and manufacturers' profits,	2,400,000	
Wages of workmen, .	9,600,000	
		£18,000,00

Number of people employed, 480,000, or perhaps 500,000.

But even this estimate requires to be materially modfied. Taking Scotland into account, and allowing for the increase of population and of exportation since Mr. Stevenson's estimate was made, the total value of the various descriptions of woolens annually produced in Great Britain may, at present, be moderately estimated at from 20,-000,000*l.* to 22,000,000*l.* or 21,000,000*l.* at a medium. We have further been assured by the highest practical authorities, that Mr. Stevenson's distribution of the items is essentially erroneous; and that, assuming the value of the manufacture to be 21,000,000*l.* it is made up nearly as follows:

Total value of manufactured articles, .		£21,000,000
Value of raw material, . .	7,000,000	
Oil, soap, dye stuffs, &c. .	1,450,000	
Wear and tear of capital and profit,	4,250,000	
Wages, . .	8,300,000	
	———	£21,000,000

At present, the average wages of the people employed may be taken at about 25*l.* a year, making the total number employed 332,000. And, however small this may look as compared with former estimates, we believe it is fully up to the mark, if not rather beyond it.

M'Culloch's Dict.

¶ *Distillation of Salt Water.*

The subject of the distillation and purification of salt water having been frequently discussed in the Mechanics' Magazine, a correspondent has favoured us with a copy of a report made by Mr. Secretary (afterwards President) Jefferson to the American Congress, "on a claim for a reward for a discovery, alleged to have been made on that subject." It contains some very interesting historical and scientific particulars respecting it, which, we believe, are not generally known; and shows, that at the date of the report, as much was known upon the subject as at the present day, and that, save a knowledge gained from experience—in one instance, rather costly—of a few plans that will not answer, we are no nearer the attainment of the desired object than we were half a century ago.

Experiments by T. Jefferson, Esq., Secretary to the United States of America, on the Distillation of Salt Water; being a Report by him to the American Congress, on a claim for a reward for a discovery alleged to have been made on that subject.

The petitioner sets forth, that, by various experiments, with considerable labour and expense, he has discovered a method of converting salt water into fresh, in the proportion of eight pints out of ten, by a process so simple, that it may be performed on board of vessels at sea by the common iron cabouse, with small alterations, by the same fire, and in the same time, which is used for cooking the ship's provisions; and offers to convey to the government of the United States, a faithful account of his art, or secret, to be used by or within

the United States, on their giving to him a reward suitable to the importance of the discovery, and, in the opinion of government, adequate to his expenses, and the time he has devoted to the bringing it into effect.

In order to ascertain the merit of the petitioner's discovery, it becomes necessary to examine the advances already made in the art of converting salt water into fresh.

Lord Bacon, to whom the world is indebted for the first germs of so many branches of science, had observed, that, with a heat sufficient for distillation, salt will not rise in vapour, and that salt water distilled is fresh. And it would seem that all mankind might have observed, that the earth is supplied with fresh water chiefly by exhalation from the sea, which is, in fact, an insensible distillation effected by the heat of the sun. Yet this, though the most obvious, was not the first idea in the essays for converting salt water into fresh. Filtration was tried in vain, and congelations could be resorted to only in the coldest regions and seasons. In all the earlier trials by distillation, some mixture was thought necessary to aid the operation by a partial precipitation of the salt, and other foreign matters contained in sea water. Of this kind were the methods of Sir Richard Hawkins, in the 16th century; of Glauber, Hauton, and Lister, in the 17th; and of Hales, Appleby, Butler, Chapman, Hoffman, and Dove, in the 18th; nor was there any thing in these methods worth noting on the present occasion, except the very simple still contrived extempore by Captain Chapman, and made from such materials as are to be found on board every ship, great or small. This was a common pot with a wooden lid of the usual form, in the centre of which a great hole was bored to receive, perpendicularly, a short wooden tube, made with an inch and a half auger; which perpendicular tube received at its top, and at an acute angle, another tube of wood also, which descended till it joined a third, of pewter, made by rolling up a dish, and passing it obliquely through a cask of cold water. With this simple machine he obtained two quarts of fresh water an hour, and observed, that the expense of fuel would be very trifling, if the still was contrived to stand in the fire along with the ship's boiler.

In 1792, Dr. Lind proposing to make experiments of several different mixtures, first distilled rain water, which he supposed would be the purest, and then sea water, without any mixture, which he expected would be the least pure, in order to arrange between these two supposed extremes, the degree of merit of the several ingredients he meant to try. "To his great surprise," as he confesses, "the sea water distilled without any mixture was as pure as the rain water." He pursued the discovery, and established the fact, that a pure and potable fresh water may be obtained from salt water by simple distillation, without the aid of any mixture for fining or precipitating its foreign contents. In 1767, he proposed an extempore still, which, in fact, was Chapman's, only substituting a gun barrel instead of Chapman's pewter tube, and the hand-pump of the ship to be cut in two, obliquely, and joined again at an acute angle, instead of Chapman's wooden tubes bored express; or instead of the wooden lid and upright

tube, he proposed a tea kettle, (without its lid or handle,) to be turned bottom upwards, over the mouth of the pot, by way of still head, and a wooden tube leading from the spout to a gun-barrel passing through a cask of water, the whole luted with equal parts of chalk and meal moistened with salt water.

With this apparatus, of a pot, tea kettle, and gun barrel, the Dolphin, a twenty gun ship, in her voyage round the world in 1768, from fifty-six gallons of sea water, and with nine pounds of wood, and sixty nine pounds of pit coal, made forty-two gallons of good fresh water at the rate of eight gallons an hour. The Dorsetshire, in her passage from Gibralter to Mahon, in 1769, made nineteen quarts of pure water in four hours with ten pounds of wood. And the Slambal, in 1773, between Bombay and Bengal, with a hand-pump, gun-barrel, and a pot, from six gallons of sea water made ten quarts of fresh water in three hours.

In 1771, Dr. Irvine, putting together Lind's idea of distilling without a mixture, Chapman's still, and Dr. Franklin's method of cooling by evaporation, obtained a premium of £5,000 from the British Parliament. He wet his tube constantly with a mop instead of passing it through a cask of water: he enlarged its bore also, in order to give a freer passage to the vapour, and thereby increase its quantity by lessening the resistance or pressure on the evaporating surface; this last improvement was his own, and it doubtless contributed to the success of his models; and we may suppose the enlargement of the tube to be useful to that point at which the central parts of the vapour, passing through it, would begin to escape condensation. Lord Mulgrave used his method in his voyage towards the North Pole, 1773, making from thirty-four to forty gallons of fresh water a day, without any great addition of fuel, as he says.

M. de Bougainville in his voyage round the world, used very successfully a still which had been contrived in 1763, by Poyssonier, so as to guard against the water being thrown over from the boiler into the pipe, by the agitation of the ship. In this, one singularity was, that the furnace or fire-box, was in the middle of the boiler, so that the water surrounded it in contact. This still, however, was expensive, and occupied much room.

Such were the advances already made in the art of obtaining fresh from salt water, when Mr. Isaacks, the petitioner, suggested his discovery.

As the merit of this could be ascertained by experiment only, the Secretary of State asked the favour of Mr. Rittenhouse, President of the American Philosophical Society, of Dr. Wistar, Professor of Chemistry in the College of Philadelphia, and Dr. Hutchinson, Professor of Chemistry in the University of Pennsylvania, to be present at the experiments. Mr. Isaacks fixed the pot of a small iron cabouse, with a tin cap, and straight tube of tin passing obliquely through a cask of cold water; he made use of a mixture, the composition of which he did not explain, and from twenty-four pints of sea water, taken up about three miles out of the Capes of Delaware at

flood tide, he distilled twenty-two pints of fresh water in four hours, with twenty pounds of seasoned pine, which was a little wetted by having lain in the rain.

In a second experiment on the 21st of March, performed in a furnace and five gallon still at the college, from thirty-two pints of sea water he drew thirty-one pints of fresh water in seven hours, twenty-four minutes, with fifty-one pounds of hickory, which had been cut about six months. In order to decide whether Mr. Isaacks' mixture contributed in any and in what degree to the success of the operation, it was thought proper to repeat his experiment under the same circumstances exactly, except the omission of the mixture. Accordingly, on the next day, the same quantity of sea water was put into the same still, the same furnace was used, and fuel from the same parcel. It yielded, as his had done, thirty-one pints of fresh water in eleven minutes more of time, and with ten pounds less of wood.

On the 24th of March, Mr. Isaacks performed a third experiment. For this, a common iron pot of $3\frac{1}{2}$ gallons was fixed in brick work, and the flue from the hearth wound once round the pot spirally, and then passed off up a chimney. The cap was of tin, and a straight tin tube of about two inches diameter, passing obliquely through a barrel of water, served instead of a worm. From sixteen pints of sea water he drew off fifteen pints of fresh water, in two hours fifty-five minutes, with three pounds of dry hickory and eight pounds of seasoned pine. This experiment was also repeated the next day, with the same apparatus and fuel, from the same parcel, but without the mixture. Sixteen pints of sea water yielded, in like manner, fifteen pints of fresh, in one minute more time, and with a half pound less of wood. On the whole, it was evident that Mr. Isaack's mixture produced no advantage either in the process or result of the distillation.

The distilled water, in all these instances, was found on experiment to be as pure as the best pump water of the city. Its taste, indeed, was not as agreeable, but it was not such as to produce any disgust. In fact, we drink, in common life, in many places, and under many circumstances, and almost always at sea, a worse tasted, and, probably, a less wholesome water.

The obtaining fresh from salt water, for ages, was considered as an important desideratum for the use of navigation. The process for doing this by simple distillation is so efficacious, the erecting an extempore still with such utensils as are found on board of every ship, is so practicable, as to authorise the assertion, that this desideratum is satisfied to a very useful degree. But though this has been done for upwards of 30 years, though its reality has been established by the actual experience of several vessels which have had recourse to it, yet neither the fact nor the process is known to the mass of seamen, to whom it would be most useful, and for whom it was principally wanted. The Secretary of State is therefore of opinion, that since the subject has now been brought under observation, it should be made the occasion of disseminating its knowledge generally and effectually among the seafaring citizens of the United States. The following is one of the many methods which might be proposed for doing this. Let the clearance for

every vessel sailing from the ports of the United States be printed on a paper, on the back whereof shall be a printed account of the essays which have been made for obtaining fresh from salt water, mentioning shortly those which have been unsuccessful; and more fully those which have succeeded; describing the methods which have been found to answer for constructing extempore stills of such implements as are generally on board of every vessel, with a recommendation in all cases, where they shall have occasion to resort to this expedient for obtaining water, to publish the result of their trial in some gazette on their return to the United States; or to communicate it for publication to the office of the Secretary of State, in order that others may, by their success, be encouraged to make similar trials, and be benefitted by any improvement or new ideas which may occur to them in practice.

TH. JEFFERSON.

Lond. Mech. Mag.

¶ *Oil Trade of Naples.*

The oils of the kingdom of Naples are produced in Apulia, from Bari to its southern extremity, the Capo di Leuca, a district comprising the territories which export from Gallipoli and Taranto; and in Calabria, from Rossano, on the gulf of Taranto, across to Gioja. The whole coast, from Gioja as far as Gaeta, is covered with olive trees. They are also abundant in the Abruzzi, and the Terra di Lavoro; but Apulia and Calabria furnish by far the greatest quantity of oil.

The principal magazines, or *caricatori*, for oil, are at Gallipoli and Gioja.

Gallipoli supplies England, Holland, the north of Europe, and, in short, all those countries that require the most perfectly purified oil. It is clarified to the highest degree, by merely keeping it in cisterns hollowed out of the rock on which the town is built. The voyages it has to perform being long, it is put into casks so well constructed, that it frequently arrives at Petersburgh, in the heat of summer, without the least waste, or leakage,—an advantage attributed to the seasoning of the staves, which, before they are put together, are well soaked in sea water.

We borrow the following details, with respect to the preparation of oil at Gallipoli, from a very interesting paper, communicated by an English gentleman who had resided in the town, in the volume entitled, *Vegetable Substances Materials of Manufactures*, published by the Society for the Diffusion of Useful Knowledge.

"The rock on which the town is built, is easily excavated, and in caverns thus constructed, oil clarifies sooner, and keeps without rancidity much longer, than in any other place. Hence, numerous oil-houses are established at Gallipoli, and a very considerable portion of the rock is cut into cisterns. A Gallipolitan oil warehouse generally occupies the ground floor of a dwelling house, and has a low arched roof. Some are more extensive, but on an average they are

about thirty feet square. In the stone floor you see four, six, or more holes, which are circular, about two feet in diameter, and like the mouths of wells. Each of these holes gives access to a separate cistern beneath your feet, and when the oil is poured into them, care is taken not to mix different qualities, or oils at different stages, in the same reservoir. One cistern is set apart for *oglio mosto*, or oil that is not clarified; another for pure oil of the season; another for old oil, &c. I have seen oil that had thus been preserved for seven years in a perfect state, or, as the Gallipoli merchants have it, *chiaro, giallo, e lampante*,—words which, during some months, I have heard at least one hundred times a day. I also many times verified the fact; the *mosto*, or oil in its turbid state, which arrived almost as black and thick as pitch, soon became bright and yellow in these excellent reservoirs, without any help from man.

"All the oil, whatever may be its quality, is brought to the magazine in sheep, or goat skins, which are generally carried on mules, there being but few *strade rotabile*, or roads fit for wheeled carriages, in these ports. In a good year, and at the proper season, I have counted, in the course of an afternoon's ride, as many as one hundred mules returning from Gallipoli, where they had been to deposit their unctuous burdens, to different towns and villages in the Terra d'Otranto, or the more distant province of Bari. The quantity of oil required may be conceived, when I state, that at one time, (in the year 1816,) I saw nine English, three American, two French, and six Genoese vessels, (not to mention some small craft from the Adriatic,) all waiting in the port of Gallipoli for entire or partial cargoes of it. When the oil is to be shipped, it is drawn off the cistern into *uteri*, or skins, and so carried on men's shoulders down to a small house on the sea shore. In that house there is a large open basin, capable of containing a given quantity, and of measuring the oil, and into that the porters empty their skins as they arrive. A tube communicates from the basin to a large cock at the outside of the house. When the basin is full, well made casks, of various sizes, for the convenience of stowage, are placed under the cock, which is then turned, and the casks are filled. As the casks are closed up by the cooper, the porters roll them down to the brink of the sea, where the sailors secure several of them together with a rope, and taking the end of the cord into the boat, they row off to the vessel, towing the oil casks through the water after them.

"I first became acquainted with the Gallipolitans shortly after the fall of Napoleon, whose system, whatever good parts of it may have done in the rest of Italy, was certainly most ruinous to the provinces of Leuca and Bari. Unable to export, or find any market for their produce, the proprietors in many parts of those provinces let the olives lie and rot upon the ground. For some years, indeed, the price of oil scarcely paid the cost of its preparation, to say nothing of transport, and other necessary expenses. During the continental system, the best *chiaro, giallo, e lampante* oil was sold at Gallipoli for eight Neapolitan ducats the salma; in 1816 and 1817, it found a ready market at from sixty to seventy ducats per salma!

"Those who, during the evil time, had penetration enough to foresee better days, and that a system opposed to the general commercial prosperity of Europe could not last, and who had, at the same time, money enough for such objects, by annually making their oil as usual, and buying up the oil of others at the low current prices of the day, realized enormous profits when peace threw open the port of Gallipoli, and ships of all nations flocked thither as before.

"The olives of which the Gallipoli oil is made, are never gathered, but allowed to drop in their maturity from the trees on the ground, where they are picked up, chiefly by women and children, and carried to the mill.

"The machinery employed in expressing the oil is of the rudest kind, and, no doubt, numerous improvements might be introduced, not only into this branch, but into that of cultivating the olive tree. The peasantry, however, and, in the kingdom of Naples, those who stand higher in the scale of fortune and rank, are too often but boors in intellect, are obstinate in their attachment to old practices, and are apt, when any of these are reprehended, to stop discussion by saying,—*Faccio come faceva la buon' anima di mio padre, e cio basta*, (I do as my father of blessed memory did before me, and that 's enough.)

"The poor people of the country make culinary uses of the same oil that is exported, and which, in England, is only used in manufactures, or burnt in lamps; but in the houses of the gentry I have often tasted oil prepared with more care, which was truly delicious, being equal to that of Sorrento, Vico, and Massa, or even to the best oils of Tuscany, or Provence."

The *caricatori* of Bari and Monopoli furnish oils for the consumption of Upper Italy and Germany, through the medium of Venice and Trieste. They also draw supplies from Brindisi and Otranto.

The *caricatori* of Taranto, of Eastern Calabria, or Retromarina, and of Western Calabria, the principal of which is Gioja, furnish supplies for Marseilles, &c. But the *caricatori* now mentioned, having no conveniences for clarification, produce only the thick oils used for soap making.

The oils of Sicily, like those of Tunis, are too thin to be used singly in the making of soap, and being used only for mixing, are less valuable than most others.

The oil trade in the provinces is in the hands of respectable houses, which purchase by retail of the several planters. The oil thus collected is sold in Naples at a profit equal to the difference between the size of the measures by which it is bought, and those by which it is sold. To facilitate transactions, orders, or *cedules*, are circulated, representing quantities of oil deposited in the provincial *caricatori*. These orders are negociable, like bills of exchange, and are endorsed by the intermediate holder, who receives their value in cash, without, however, becoming liable for their due satisfaction. The only responsible parties are the drawer and drawee. The latter is obliged to deliver the oil at sight of the order, or to hold it, at the bearer's disposal, till the 10th of November, for the *caricatori* of Apulia, and

till the 31st of December for those of Calabria. If the contract be for time, that is, from one year to another, the oil is usually placed at the purchaser's command on the 1st of March. Purchases for time are effected by means of a contract, wherein the vendor undertakes to deliver the oil by the end of January, on receiving payment of the money; but the oil, as observed above, is not really at the purchaser's disposal before the beginning of March. Hence, in time bargains, the payment of the money precedes the delivery of the oil more than a month; scarce an instance is on record of an engagement of this sort having been broken, and the order is as readily negociable as any other security.

In purchases of oil at command, payment likewise precedes the delivery of the article; but in this case, the advance is confined to the five days necessary to transmit the order to the *caricatore* where the oil is kept for delivery.

The oil remains in the *caricatore*, under the care and responsibility of the vendor, to be delivered, on demand, to the bearer of the order, free of all costs and charges whatever for the first year; but for every successive year, from twenty-five to thirty grains per salma are charged for keeping, and for renewal of warranty.

[*M'Culloch's Dict.*

Notice of an easy Method of filling long Syphon Tubes, in a Note addressed (by request) to the Editor. By William Foster, Esq.

New Haven, Nov. 26, 1834.

Sir,—Agreeably to your request, at the conclusion of your very interesting lecture, I will now put on paper a brief statement of the application of the syphon upon a large scale, for the purpose of drawing water from distant places. This application may not be new; but I do not remember to have seen it in this, or any other country, before I tried the experiment. The ancients, we know, brought water for the supply of their cities, by means of costly aqueducts, over hills and vallies, without ever using the fountain principle.

About twenty years ago, I suggested to some gentlemen in Boston the feasibility of conducting water from one good well to dry reservoirs in the neighbourhood, in consequence of hearing that certain wells in the city had copious springs of good water, which became bad for want of sufficient use. The idea of carrying water through a syphon several hundred feet in length, and drawing water from one well into another, was discussed by these gentlemen, and treated with ridicule. But some years after, Mr. Chapman, proprietor of a distillery in Charlestown, requested me to describe the process; and with that instruction, he employed a plumber to lay a leaden tube of three quarter inch bore, from a well twenty-five feet deep, several hundred feet distant from the well of his distillery, which was about thirty feet deep, and where he wanted a greater supply of water.

The operation failed. He then came to me, and told me that I had led him into an expensive error. I told him that, had he com-

municated to me his intentions, I would, with great pleasure, have superintended the work; but now, not knowing what defects there might be in the tube, I could not answer for his success. However, I consented to assist him, but my first essay was unsuccessful.

I need not inform you, sir, as to the principles of the syphon, or that its power to overcome an eminence is limited to about thirty-two feet, answering to the column of water which the pressure of the atmosphere can raise; or that any defect in the syphon, or any air confined in it, would be fatal to its operation. The usual mode of charging a syphon, you know, is by exhausting it partially by inspiration at the longer end. But this was not possible with a tube several hundred feet long, and the expense of a pneumatic apparatus, to procure a vacuum, would have been too great; therefore, I had determined to put it in operation by filling it with water, both ends being stopped; this was done by a small branch at the summit of the tube; and, when filled, this branch was well corked, and the cork pressed down hard on the water, so as to exclude all the air at the surface. It was to be apprehended that some undulations might exist in the horizontal part of the tube, and afford a receptacle for air, which would there be confined without a possibility of escaping, and also prove fatal to the success of the experiment; but of this I could know nothing, as I had not seen the tube laid.

In this state of uncertainty, I began the operation, and filled the syphon; but, as I said before, it failed. On the second trial, I observed that, when the syphon was full, the water in the filling branch rose and fell alternately, and so much, that as water has but little elasticity, I concluded that there was air in the tube, and it was, therefore, emptied. Then, to charge it anew, and, at the same time, to exclude the air, it was proposed to perforate the lower end of the long branch, at the bottom of the receiving well, with a fork, just above the cork which closed it. These small holes allowed the air to escape as it was driven before the water, without losing enough water to prevent the filling the tube with ease. Thus was the air excluded, and the syphon put into operation, and continued for a long time, with some occasional obstruction, arising from the smallness of the tube, and the want of water at the source.

I should suppose that there were many situations where water might be brought from one valley to another, over any hill not exceeding thirty-two feet, or which could, without too much expense, be reduced to that point, for the purposes of irrigation, or manufacturing. Large quantities of water, as well as small, may be raised by means of iron mains, of large dimensions; and the cutting down hills to procure levels, or surrounding them, and thus increasing the length of aqueducts, at a great expense, and loss of water by percolation and evaporation, may be avoided. Mountain swamps may be drained, or any swamps, where a lower level is not too far distant for the place of issue, or even in a level country, provided some vein of loose gravel can be found, into which a place of discharge may be dug below the surface of the swamp. The ingenuity of our country-

men, will, I am confident, yet find many other useful purposes to which the principle may be applied.

P. S. Have you any knowledge of the process whereby the Chinese convert rice into a substance resembling pearl? If it were not expensive, many useful articles might be made of it.

[*Silliman's Am. Jour.*

¶ *Experiments to ascertain the Existence of Lead in the Atmosphere of a White Lead Manufactory.* *By* Mr. Arthur Dunn.

Having witnessed at my manufactory, the frightful effects of white lead on the workmen employed, I was anxious to determine if it was possible for lead to exist in the atmosphere, and, through that medium, be absorbed into the system by the action of the lungs. For this purpose I made the following experiment, which certainly is important to the manufacturer, as it points out a serious evil to be guarded against. I shall now merely confine myself to the results obtained, and leave to some of your more scientific friends, any theoretical reasoning, or practical hints, the experiment may suggest, provided you consider it worthy to occupy a space in your valuable magazine, and remain, Yours, &c.

Arthur Dunn.

An evaporating dish, containing about twenty-eight pounds of moist carbonate of lead, was placed in a sand bath, and heated to about the same temperature as the drying stove commonly used, never exceeding 150° Fahr.; over this was fixed, at the distance of from eight to twelve inches, a pair of common bellows, with a glass tube attached to the pipe, which pipe was introduced into a green glass bottle containing twelve ounces of distilled water, acidulated with two drachms of nitric acid. The apparatus being thus arranged, the bellows were set in action, by which means the atmosphere, loaded with the moisture from the lead, was made to pass in a continued current through the liquid; this was continued for six hours. The whole was then transferred into a platina dish, and evaporated to perfect dryness. The residue was dissolved in one ounce of distilled water, with two drops of nitric acid, to insure the solution of the lead, should any be present. A current of sulphuretted hydrogen was next passed through the solution, which immediately gave a minute dark precipitate; this being collected on a filter, and washed, was transferred to a watch-glass, and treated in the usual manner with nitric acid to decompose the sulphuret, which gave, on the application of hydriodate of potash, the most unequivocal proof of the presence of lead.

Another experiment was conducted at the same time, with similar vessels, in the same room, but the current of air was not passed through the liquid. This, on the application of sulphuretted hydrogen, gave not the least indication of lead, but, on evaporating the whole to dryness, and treating the residue, in the manner

before described, with hydriodate of potash, the slightest possible trace of the yellow iodine of lead was perceptible. The nitric acid and distilled water were separately tested with great care, but were found perfectly free from lead, so that, no doubt, the trace of lead must have been absorbed from the atmosphere, as the bottle containing it stood beside the one through which the current of air was passed. I ought to have mentioned before, that the temperature of the laboratory during the experiment was from 70° to 80° Fahr., and that the door was kept closely shut, that the air might be loaded as much as possible with the vapour.

[*Lon. and Ed. Phil. Mag.*

¶ *Self-acting Mules.*

"Mules have been constructed which do not require the manual aid of the spinner, the mechanism being so contrived as to roll the spindle carriage out and in at the proper speed, without a hand touching it; and the only manual labour employed in these machines, which are called self-acting mules, is that of the children who join the broken threads. The first machine of this kind was invented by the ingenious Mr. Strutt, F. R. S., of Derby, the son of Mr. Jedediah Strutt, the partner of Arkwright; and the following mention is made of it in a memoir of that gentleman, written by his son, Mr. Edward Strutt, at present member for Derby. Mr. Strutt died on the 29th of December, 1830, and the memoir appeared shortly after in a periodical journal: 'Among his other inventions and improvements, we may mention a self-acting mule for the spinning of cotton, invented more than forty years ago, [therefore before 1790;] but we believe the inferior workmanship of that day prevented the success of an invention, which all the skill and improvement in the construction of machinery of the present day has barely accomplished.'"

But the self-acting mule which has met with most success, is that invented by Mr. Roberts, of the firm of Messrs. Sharp, Roberts, & Co., of Manchester. For all the finer qualities of yarn, it is the only machine now employed.

"By this machine, for which the first patent was taken out in 1825, and the second, for a further improvement, in 1830, a very close approach to perfection seems to be made. It produces a considerably greater quantity of yarn, of more uniform twist, and less liable to break, and it winds on the cop more evenly and closely, so that the yarn is more desirable for the weaver. Roberts' self-acting mule is coming rapidly into use throughout the spinning district. In March, 1834, the patentees informed me that they had made 520 self-acting mules, containing upwards of 200,000 spindles, and that the number was likely to be more than doubled in the course of the year. One of the recommendations of this machine to the spinners, is, that it renders them independent of the working spinners, whose combinations and stoppages of work have often been extremely annoying to the masters."

[*Review of Baines' Hist. of the Cotton Manufactures.*

¶ *Water obtained by Boring.*

Artesian wells have been very successfully constructed in some parts of France. A letter from M. Jauburt de Passa, to Viscount Hericart de Thury, describes a bored well, remarkable for the abundance of water which it supplies. It was made by M. Durand, two leagues south-east of Perpignan.

The sound, after penetrating to the depth of eighty feet, through alternate beds of marl and clay, entered a bed of sandy marl, three feet thick, from which issued a jet of water, very clear, but, from the peculiarity of its taste, unfit for drinking. Its temperature was 14°.5 Reaumur, (equal 65° Fahrenheit,) and it rose from three to four feet above the surface.

A second boring, undertaken at the distance of six feet from the first, gave, at the same depth, a jet of water, but the first jet diminished, and the quantity of water from both was less than that which first issued from the former. The boring of the latter was then continued to the depth of one hundred and forty-five feet, when the sound began to sink of itself, and when precipitately withdrawn, the water rushed up to the height of five feet, and astonished all by its abundance and force. No obstacle could restrain it. No direct attempt was made to determine the maximum height to which it might rise, but fifty feet was decreed to be fully within the limits of its ascending force.

At the time the letter was written, several weeks after the first issue of the water, it continued to flow with the same violence, and with rather increased quantity. From the dimensions and velocity of the current, it appeared to supply four hundred and thirty gallons per minute, or two thousand eight hundred and eighty cubic metres per day. A leaden weight of eight pounds, supported by a string, being placed in the tube, was rapidly thrown out by the water.

The water, which at first had a peculiar taste, but not disagreeable, is now very limpid and insipid, and its temperature 66 degrees of Fahrenheit. The total expense of the well was two hundred and sixty-three francs. [*Lond. Journ.*

¶ *Painted Binding.*

Many beautiful subjects may be formed on the sides of books, by the workman skilled in painting. The volume is prepared by being paste-washed, so as to present an uniform fawn colour, the designs slightly traced, and afterwards coloured according to the pattern, the colours being mixed to the proper shade with water. The shades must be tried on pieces of refuse leather, as, being spirit colours, when once laid on, no art can soften them down, if too strong, and a peculiar lightness of touch will be necessary to produce effect. Portraits, &c., may also be executed in this manner; and many su-

perb designs have at times been executed by the best binders of this country and France. M. Didot, bookseller, of Paris, presented a copy of the "Henriade," published by himself, to Louis XVIII., most elegantly ornamented in this style. It was executed by M. Bellier, bookbinder, of Tours, and presented, on one side, a miniature portrait of Henry IV., and, on the other, a similar one of Louis XVIII., both perfect likenesses. The greatest difficulty consisted in the portraits, which were first imprinted on paper, very moist, and immediately applied to the cover, on which they were impressed with a flat roller. When perfectly dry, they were coloured with all the art of which the binder was capable, and the other ornamental paintings executed by hand. This proceeding requires great care in the execution, and will be applicable to any design where the binding will justify the expense. [*Lond. Mech. Mag.*

¶ *Indian Ink.*

An easy and expeditious method of providing a substitute for Indian ink, is to boil parchment slips, or cuttings of glove leather, in water, till they form a size, which, when cold, becomes of the consistency of jelly; then, having blackened an earthen plate, by holding it over the flame of a candle, mix up, with a camel hair pencil, the fine lamp-black thus obtained, with some of the above size, while the plate is still warm. This black requires no grinding, and produces an ink of the very same colour, which works as freely with the pencil, and is as perfectly transparent as the best Indian ink. It likewise possesses the advantage of furnishing artists with a substitute for that article, which may be prepared where it may be difficult to obtain the ink itself. [*Lond. Mech. Mag.*

List of American Patents which issued in September, 1835.

		September
521.	*Lever press.*—Jonathan Payne, Russelville, Ky.	9
522.	*Churn, and washing machine.*—Thomas Ling, Winthrop, Maine,	9
523.	*Washing and fulling machine.*—Orin D. Wade, China, New York,	9
524.	*Potters' clay, purifying.*—Adam Weber, Wormelsdorf, Penn.	9
525.	*Platform for rail-roads.*—John Tustin, Philadelphia,	9
526.	*Corn shelling machine.*—Elijah Morse, Knox county, Tenn.	9
527.	*Hydraulic cement.*—Obadiah Parker, New York,	9
528.	*Artificial stone.*—Obadiah Parker, New York,	9
529.	*Artificial stone.*—Obadiah Parker, New York,	9
530.	*Water, application of, to mills.*—J. W. Dart, and S. Wood, Fabius, New York, ...	9
531.	*Gum elastic cement.*—Charles Goodyear, New Haven, Conn.	9
532.	*Steam engine.*—John Bennock, Penobscot, Maine,	9
533.	*Scales for weighing.*—Jesse Marden, Baltimore,	9
534.	*Rail-road cars.*—Charles Davenport, Cambridge, Mass.	9
535.	*Dead spindle.*—Henry G. Davis, Northborough, Mass.	9
536.	*Disengaging horses.*—Gotlieb Shultz, Philadelphia,	9
537.	*Railway cars.*—Anthony Sherman, Philadelphia,	9

		September
538.	*Corns, curing.*—William Davies, Williamsburg, Virginia,	9
539.	*Coffee mill, &c.*—E. Morse and C. Putman, Knoxville, Tenn.	9
540.	*Bedstead for invalids.*—N. Richardson, Boston,	9
541.	*Saw set.*—Lewis Barrymore, Hanover, New York,	9
542.	*Stamp for post offices, &c.*—Benjamin Chambers, Washington city,	9
543.	*Supplying air to fires.*—Robert Mayo, Washington city,	9
544.	*Gauging saw logs.*—William A. Needham, Brimfield, Massachusetts,	9
545.	*Cooking stoves.*—J. Whiting and J. Mears, Boston,	9
546.	*Coopers' howel and croes.*—Melancthon Sutton, Penfield, N. Y.	9
547.	*Washing machine.*—James Lombard, Readfield, Maine,	9
548.	*Saw mill.*—Linus Yale, Utica, New York,	11
549.	*Breaking sward ground.*—Guy Gray, Industry, Maine,	18
550.	*Looms for weaving stocks.*—Conrad Kyle, Erie, Penn.	18
551.	*Tailors' measure.*—John S. Rockafellow, Hemington, N. J.	18
552.	*Beds, cots, &c.*—W. J. Lyman, and A. E. Lyman, East Hampton, Mass.	18
553.	*Plough.*—P. Stahl, and B. Diffenbacker, Northampton county, Pa.	18
554.	*Wool and flax machine.*—Wm. W. Colvert, Lowell, Mass.	18
555.	*Printing and dying woolens.*—Wm. Duncan, Belville, N. J.	18
556.	*Planting cotton machine.*—Robert T. Goodman, Ballsville, Va.	18
557.	*Corn shelling.*—J. S. Harris, Poultney, Vermont,	18
558.	*Boxes in hubs, setting.*—E. Badlam, Jr., Chester, Vt.	18
559.	*Timepieces propelled by air.*—Andrew Morse, Jr., Bloomfield, Me.	18
560.	*Dressing hoops.*—B. Kimball, A. Pevey, and F. Spalding, Peterborough, New Hampshire, ...	18
561.	*Cradling machine.*—Edward Badlam, Jr., Chester, Vermont,	18
562.	*Seed collector.*—D. Ashmore, and J. Peck, Jefferson county, Tenn.	18
563.	*Mill stones, dressing.*—D. B. Napier, Casey county, Kentucky,	18
564.	*Saw mill carriage.*—Samuel Phelps, Mount Morris, N. Y.	18
565.	*Propelling boats.*—J. L. Smith, Charleston, S. C.	18
566.	*Glue, manufacturing.*—Jonathan Morgan, Portland, Maine,	18
567.	*Cooking stove.*—Ezekiel Daball, North Canaan, Conn.	26
568.	*Gathering clover seed, &c.*—Hiram Holt, Weld, Maine,	26
569.	*Turning boots, machine for.*—S. C. Blodgett, and H. Boynton, Rowley, Massachusetts, ...	26
570.	*Cooking stove.*—P. Page, Rowley, Mass.	26
571.	*Forge.*—J. Knickerbacker, Laporte, Indiana,	26
572.	*Boilers, alarm for.*—Thomas Odiorne, Malden, Mass.	26
573.	*Chimney and fire-place.*—Moses Perin, Connersville, Indiana,	26
574.	*Grist mill.*—Owen Moses, Malone, New York,	26
575.	*Blower, spiral cone.*—Benjamin Brundred, Oldham, N. J.	26
576.	*Washing machine.*—J. J. and E. C. Milliken, Winthrop, Maine,	26
577.	*Mead.*—Theo. J. Kimball, and A. H. White, Dedham, Mass.	26
578.	*Forges, &c., air applied to.*—S. W. Watson, and C. Robinson, Ashtabula, Ohio, ...	26
579.	*Financiering, plan for.*—John Golder, Philadelphia,	26
580.	*Silk weaving by power loom.*—Gamaliel Gay, Poughkeepsie, N. Y.	26
581.	*Writing ink.*—John D. Myers, New York,	26
582.	*Rope and cordage.*—William Fanning, New York,	26
583.	*Turning curves on rail-roads.*—J. Stimpson, Baltimore,	26
584.	*Forming rail-road plates.*—J. Stimpson, Baltimore,	26
585.	*Shingles, shaving.*—Wm. H. Wilkinson, Wayne, Ohio,	26
586.	*Saw mill machinery.*—John Muir, Menallen, Penn.	26
587.	*Bedstead.*—Perry Prettyman, Georgetown, Del.	26
588.	*Mortising machine.*—Charles Gates, Antrim, N. H.	26
589.	*Double speeder.*—William Field, North Providence, R. I.	26

CELESTIAL PHENOMENA, FOR DECEMBER, 1835.

Calculated by S. C. Walker.

Day.	H'r.	Min.					
3	11	6	Im.	34 Tauri,	,7,	N. 49°	V. 3°
3	11	42	Em.			353°	22°
4	6	14	N. App. ☽ and τ Tauri,		,5,	☽ South 2.′2	
8	9	14	Im.	λ Cancri,	,6,	124°	70°
8	10	10	Em.			232°	176°
10	11	38	Im.	η Leonis,	,3,4,	25°	28°
10	12	30	Em.			295°	242°
12	12	3	Im.	ν Virginis,	,4,5,	55°	5°
12	13	3	Em.			252°	201°
16	15	38	Im.	v Libræ,	,6,	18°	33°
16	16	16	Em.			286°	236°
31	14	47	Im.	τ Tauri,	,5,	99°	155°
31	15	49	Em.			273°	326°

Meteorological Observations for August, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	71°	79°	29.62	29.62	W.	Moderate.		Cloudy—flying clouds.
	2	59	71	.80	.86	W.	do.		Lightly cloudy—clear.
	3	59	75	.86	.86	W.	do.		Clear day.
	4	54	69	.90	.95	NW.	do.		Lightly cloudy—clear.
	5	56	74	.95	30.00	SW. S.	do.		Lightly cloudy.
	6	62	63	.80	29.80	NE.	do.	0.58	Rain—cloudy.
	7	56	72	.85	.93	NW. W.	do.		Clear—flying clouds.
☺	8	58	72	30.00	30.00	W.	do.		Lightly cloudy—clear.
	9	61	78	.00	.00	SW.	do.		Clear day.
	10	60	77	29.90	29.90	S.	do.		Clear—lightly cloudy.
	11	66	73	.85	.85	E.	do.	0.05	Cloudy—rain.
	12	69	72	.80	.80	SE.	Brisk.	0.60	Drizzle—rain.
	13	69	81	.80	.80	SW.	Moderate.		Cloudy—flying clouds.
	14	71	78	.80	.80	W.	do.	0.25	Cloudy—showers.
	15	69	77	.80	.92	E.	do.	0.02	Cloudy—drizzle.
☾	16	72	80	.80	.80	W.	do.		Cloudy—flying clouds.
	17	67	81	.65	.90	W.	do.		Clear day.
	18	70	78	.80	.70	SE.	do.	0.35	Showers—gale of wind, thund. & lightning.
	19	67	76	.65	.75	W. NW.	Brisk.	0.03	Clear—showers.
	20	62	76	.80	.84	W.	do.	0.03	Cloudy—rain.
	21	56	68	.70	.70	W. NW.	do.		Cloudy—flying clouds.
	22	57	61	.70	.80	W. SW.	do.		Clear—cloudy.
⊗	23	51	69	30.00	30.00	NW.	do.		Clear day.
	24	54	73	00	.05	W.	do.		Lightly cloudy.
	25	60	79	29.95	29.85	W.	Moderate.		Lightly cloudy.
	26	67	74	.74	.74	SE.	do.	0.54	Cloudy—rain.
	27	68	77	.75	.80	S. SW.	do.		Fog—light clouds.
	28	68	78	.80	.90	SW.	do.		Cloudy—light clouds.
	29	67	79	.90	.90	W.	do.	0.01	Lightly cloudy—high wind in n't.
☽	30	63	72	.85	.85	W. NW.	do.		Clear; light clouds. [sprink'g rain
	31	57	69	.83	.83	W.	Brisk.		Clear—floating clouds.
	Mean	62.87	74.23	29.82	29.85			2.46	

	Thermometer.	Barometer.
Maximum height during the month,	81. on 13th and 17th.	30.05 on 24th.
Minimum do.	54. on 4th, 23d, & 24th.	29.62 on 1st.
Mean do.	68.55	29.84

JOURNAL

OF THE

FRANKLIN INSTITUTE

OF THE

State of Pennsylvania,

DEVOTED TO THE

MECHANIC ARTS, MANUFACTURES, GENERAL SCIENCE,

AND THE RECORDING OF

AMERICAN AND OTHER PATENTED INVENTIONS.

DECEMBER, 1835.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.

Description of a successful Experiment with the Heated Air Blast, made at the Oxford Iron Furnace, New Jersey.

(WITH A COPPERPLATE.)

During a recent visit to Oxford Furnace, in Warren county, New Jersey, on some observations connected with the mineralogy of that neighbourhood, my attention was drawn to an arrangement for applying the *hot blast*, which much interested me, on account of the economical simplicity of its construction, and the encouraging results obtained through it.

Upon expressing a wish to make public, through the Journal of the Franklin Institute, this first successful experiment of the kind in our country, I was furnished by Mr. Henry, the enterprising conductor of the furnace, with a detailed description of the whole attempt. In a spirit of liberality worthy of all praise and imitation, he placed in my hands all his memoranda, exposing the history of the comparative efficacy of the hot and cold blast at this furnace, and, furthermore, gave me possession of drawings of a new and improved form of the apparatus for heating, which he is now constructing, to be put into operation when the furnace again goes into blast.

In the hope that the brief account which I have to offer, may prove of some service in promoting the introduction of that which is con-

fessedly the greatest of modern improvements in the important art of smelting iron, I beg leave to state the comparative trials of the two species of blast at this furnace, in the order in which the furnace was worked, the better to make their relative effects understood.

It should be borne in mind that this experiment, as far as it has yet proceeded, professes to be merely a preliminary attempt, introductory to a more permanent arrangement, hereafter to be adopted; and it is felt to be defective, therefore, in several points. For example, the *temperature* of the air used in the blast was found to be quite too low to ensure that full result which the mode of apparatus employed is supposed capable of yielding. The experiment was imperfect, moreover, from the absence of any precise instrumental observations to ascertain exactly what the temperature of the air was.

To make more intelligible the amount of benefit derived from the heated blast, it seems proper to furnish a brief statement of the capacity of the furnace, and its operation when under the cold blast.

Oxford Furnace passed into the hands of its present enterprising masters, Henry, Jordan & Co., in 1832, and was worked during that and the two succeeding years, on the ordinary plan, with cold air. The partial experiment with heated air was made during the months of June and July, of the present year, 1835.

The height of the furnace stack, from the tunnel head to the bottom stone, was, at first, $33\frac{1}{3}$ feet, but was afterwards, in 1834, reduced to $31\frac{1}{3}$ feet; the height of the hearth to the boshes is five feet; the inclination of the boshes was at first eleven inches to the foot, and was subsequently changed to ten and a quarter inches to the foot, at which it stood during the employment of the heated air.

In the more complete arrangement for applying the hot blast, about to be introduced, the inclination of the boshes is to be altered to nine and a half inches. This is in consequence of the increased temperature within the furnace making it necessary to give more support to the burden. The width on the boshes is six feet six inches, and in the tunnel sixteen inches.

With these dimensions, the rate of working, or yield, of the furnace, was,—

In 1832, for nineteen weeks and four days, $327\frac{1}{3}$ tons, or an average of 16.7 tons per week.

In 1833, the product for thirty-two and a half weeks, 638.1 tons, or 19.6 tons of iron per week.

During this year, the quantity of charcoal consumed in making one ton of iron was 243 bushels, of eighteen pounds to the bushel.

In 1834, still using the cold blast, but employing an improved quality of charcoal, the product, for twenty weeks and five days, was 240.4 tons, or 11.6 tons per week.

So low a product was due to the hard and refractory character of the ore then used. It was taken from a considerable depth, was very compact, and a portion of it yielded iron having the quality called red short. This year, the consumption of coal to the ton of iron, was 226 bushels of a coal weighing twenty-two pounds to the bushel.

In 1835, the coal being similar to that of the previous year, and the ore of its ordinary much better quality, the product of iron was at the rate of 18.9 tons per week.

While the smelting with heated air was in progress, the consumption of coal to the ton of iron was only 165 bushels, being a saving, compared with the previous year, of sixty-one bushels per ton.

It should be mentioned, moreover, that the new blast was applied in the months of June and July, a season when the product of a furnace is well known to be less than its average rate for the whole year.

The charcoal employed in the Oxford furnace, is a mixture of oak and chesnut, about two-thirds oak. Much commendable care is employed in its manufacture, so that a cord of 128 cubic feet is required to yield at least forty bushels, of a capacity of 2356 cubic inches to the bushel.

The flux used is the blue limestone of the vicinity of Scott's mountain, where the furnace is situated.

The ore smelted at this furnace is the magnetic oxide of iron. It is mixed with but little foreign matter, and occurs in veins, several feet wide, in Scott's mountain. It makes an excellent, tough, bar iron, and is also well adapted, and extensively used, for making castings, and pig iron.

Description of the Apparatus for Heating the Blast.

This plan of supplying the furnace with air at an elevated temperature, is upon a principle said to be in use in Germany. It consists in urging the cold air from the bellows, through tubes laid adjacent to the most highly heated part of the furnace, in place of heating it by separate fuel, in an apparatus detached from the furnace. The contrivance is this: Two hollow cast-iron boxes, 2 feet 9 inches high, 15 inches deep, and 8 inches wide, are set into the masonry, on each side of the false tymp, and placed directly in contact with the main tymp, and with their broadest sides facing each other. A series of tubes, eighteen in number, pass from one box across to the other, and are so arranged immediately above the top of the false tymp, that the flame which plays in front of the main tymp, and under the sow, may pass around them as freely as possible. The interior diameter of the tubes is two inches. Their position in front of the hottest part of the furnace is such as to enable them to be highly heated, as well by the external flame, as by the heat radiated from the main tymp.

The air in being urged through these tubes, is, therefore, made to acquire a very considerable elevation of temperature.

In the diagram before us, fig. 1, *a* represents the large pipe which brings the blast from the bellows to the heating apparatus. It is curved, in order to pass round from the side of the furnace where the tuyere is, to the front. It passes close to the main tymp, and enters the remote box, *b*. From this the air escapes through the tubes into the opposite box, *b′*, and finds its exit thence through the curved

pipe, *c*, which leads it in a heated state to the tuyere; *d* represents a side view of the boxes, *b*, *b'*.

No arrangement was made for measuring the temperature of the air, as it issued from the second box, further than adapting a valve in the side of the pipe, *c*. The temperature, estimated there by the sensation on the hand, was judged to have been about 200° of Fahrenheit.

In the improved mechanism for heating the air, which is intended to take the place of this, there will be a thermometer to indicate the temperature of the passing air precisely.

At the same time that the apparatus here described was erected, a modification in the false tymp was made, to keep it cool, and thus prevent that rapid destruction of it, to which it is liable, under the high heat of the front of the furnace. It was designed to achieve this by making it a hollow cast-iron box, and transmitting through the interior a current of cold water, to enter below, and to issue at top.

The thickness of the iron in the bottom of this hollow false tymp, was two inches at bottom; at the back, it was one and a half inches; and in front it was one inch. It was found, however, not to be stout enough beneath, for it soon gave way under the action of the fire.

Imperfect as Mr. Henry admits the above arrangement to have been, he was fully convinced, during the trial, of the useful results to be procured from such a form of apparatus.

Independently of the very considerable saving of sixty-one bushels of the best charcoal to each ton of iron, there was a steadiness in the working of the furnace, and, therefore, an uniformity in the quality of the iron, of no small object in every extensive establishment.

As a consequence of this regularity in the action of the furnace, it was found that the superintendence of the man who managed the tuyere could almost be dispensed with; so much so, that even after casting, during which the blast is usually taken off, no scraping of the tuyere was necessary to detach the congealed cinder which commonly adheres, proving how much higher the temperature of the furnace remains, when the heated air is employed. It would seem, indeed, that weather and season have little or no effect in deranging the working of a furnace driven by the hot blast.

It remains to describe concisely the other form of the apparatus for heating the air, which Mr. Henry is now constructing.

The object of this, which is upon the same principle as the first, but considerably modified and improved, is to procure a higher temperature in the blast, and, at the same time, to preserve the desired coolness in the false tymp, by passing the *blast* through it, in substitution of the water before employed. The false tymp is, therefore, hollow, and forms a part of the chain of connection through which the air from the bellows is made to circulate.

Fig. 2 shows the position of the semicircular pipe, which leads the cold air from the bellows, round the stack, to the side of the main tymp; here the pipe descends to enter the side of the false tymp, an end view of which is seen in fig. 3.

In fig. 3, a profile, or side view, is presented, of the manner in

Fig 1.

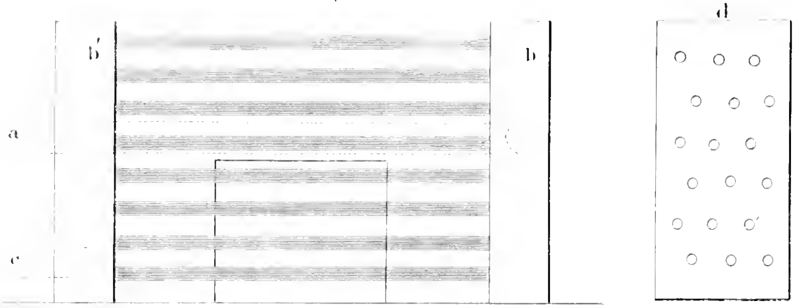
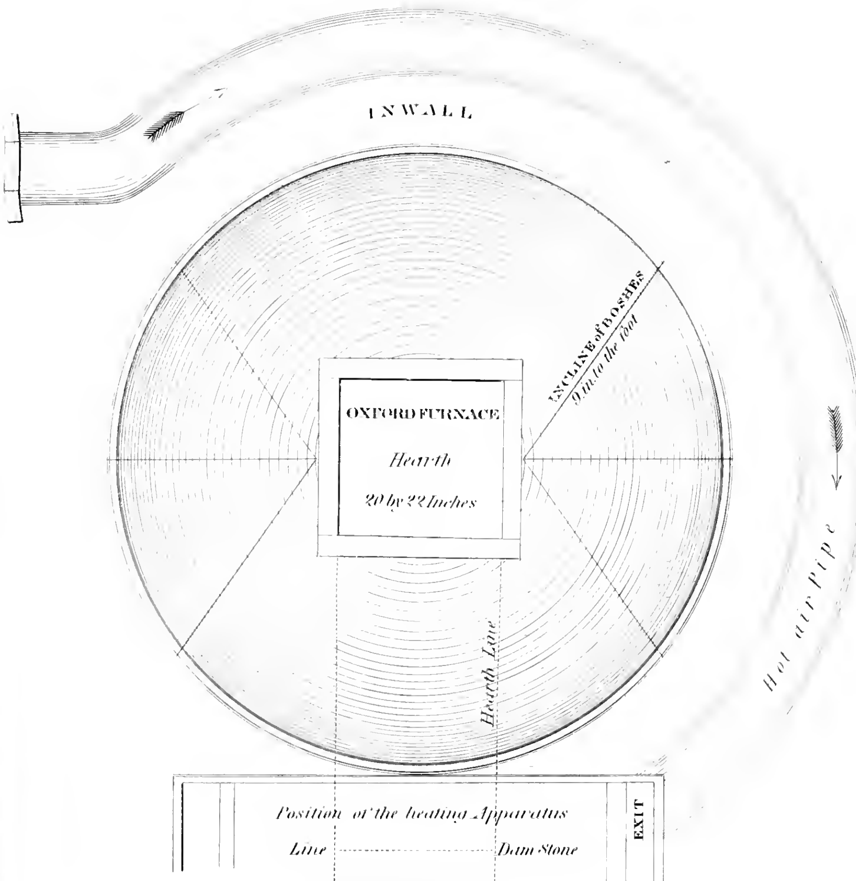


Fig 2.



Scale ½ Inch to a foot

which the air is conveyed, from the interior of the false tymp, through a series of syphon shaped pipes, into the front chamber of a box, which lies in front of, and parallel to, the false tymp.

This box is divided by a partition into two chambers, an opening at one end of the partition permitting the air received into the front chamber from the pipes, to pass behind into the other; from this it issues through a large pipe, which curves round the angle of the furnace, and conveys the air to the tuyere.

The dimensions of the several parts may be seen in the figure, 3.

Fig. 4 represents a front view of the anterior box, and the air pipes, seven in number, which connect it with the false tymp in the rear. The doorway in the middle of this front box is designed to permit the flame and heated air which play up near the dam stone, to pass between and envelope the pipes, previous to escaping under the sow.

The whole is of cast-iron, the lower part of the walls of the hollow false tymp being at least four inches thick.

In the pipe which leads the air, heated by traversing the tymp, the tubes, and the two chambers of the front box, from the latter to the tuyere of the furnace, there will be a contrivance placed to receive a mercurial thermometer. It will consist of a tube of copper, of about one inch diameter, and six inches length, closed at one end, and the closed end inserted three or four inches through the side of the pipe, so as to expose it to the current of heated air which passes along the pipe, and which will impart its own temperature to it. This tube will be filled to a small height with quicksilver, and the thermometer bulb made to dip into the mercury. The scale of the thermometer will, of course, project out of the tube, that the temperature recorded upon it may be seen.

Mr. Henry intends keeping a daily register of temperature of the blast, and the state of the furnace. Such a register will be highly interesting, and we wish every success to the ingenuity of the liberal and enterprising masters of the Oxford Furnace.

On the Transport of Heavy Burthens upon Ice. By THOMAS JEFFERSON CRAM, Prin. Assist. Prof. of Nat. and Exp. Philos., U. S. Mil. Acad.

TO THE COMMITTEE ON PUBLICATIONS.

GENTLEMEN,—Having seen an account of the following experiments on the resistance of ice, by Assistant Professor Cram, I deemed it of sufficient interest to your readers to request from him permission to publish it. He has kindly furnished the following abstract, which is transmitted for publication.

Very respectfully, yours,
A. D. BACHE.

West Point, Oct. 7th, 1835.

DEAR SIR,—For ordnance purposes, it became necessary, on the

13th of January, 1835, to transport a heavy piece of artillery (an iron 24 pounder) across the Hudson, from West Point, to Cold Spring Foundry. To ensure safety, two ox sleds were connected, one after the other, and upon which two timbers were longitudinally placed and secured; between these timbers, the gun, previously dismounted from its carriage, was swung, by resting its trunnions upon them, at such points that the whole pressure was distributed, as uniformly as possible, upon the ice which sustained it. A pair of horses were attached to another sled, which was connected with the foremost of those before named, by a rope about thirty feet in length.

The ice over which the gun was taken, had been chiefly formed during that intensely cold week, (in January, 1835,) when the mercury in Fahrenheit's thermometer ranged, here, between $-2\frac{1}{2}$ and -15. The effects of the pressure upon the ice were carefully observed, by myself, along the entire route, and were such as to induce the belief that an idea of its strength could be formed with sufficient certainty to be of practical utility, in all cases where the safety of transporting any load upon ice might be jeoparded.

The ice was drilled through, and its thickness measured, to a tenth of an inch, at intervals of two hundred paces and less, along the whole extent of the track. From the place of departure, to the channel of the river, the thickness diminished from 16.5 in. down to 8 in., and no signs of cracking or bending were observed in the ice—the horses going at the rate of about four miles an hour Across the channel, the thickness increased from eight inches to twelve inches, and no evidence of breaking or bending was exhibited,—the load moving with a speed of about eight miles an hour. From the west edge of Cold Spring flats, to the vicinity of the entrance of a creek, the thickness varied from 12 in. up to 15.5 in., and no indications of yielding were perceived, the horses going at a gentle trot. Near the entrance of the creek, for an extent of fifty paces, the average thickness of the ice was only 5.56 in., and it was covered with a sheet of snow water, two inches in depth. This fifty paces of ice was observed to bend so much under the gun, that I was very apprehensive of its breaking; indeed, had the load been stopped for a few seconds only, it undoubtedly would have gone to the bottom. The depression along here was at least two inches, and the flexure of the ice under the foremost of the sleds, bearing the gun, was less than that under the hindmost, owing to its being weakened by the former, ere the latter came upon it. On crossing this weak spot, the horses had become so much fatigued, and the resistance increasing, by being drawn up the inclined surface of the bending ice, that, with much whipping and shouting, they were barely urged to drag the gun safely over, at a velocity of about four miles an hour.

To determine the pressure sustained by a given superficies of the ice under consideration, it is to be remarked, 1st, That, from the dimensions of the bottom surfaces of the four sled runners under the gun, the whole surface of ice in contact with these bottom surfaces, at the same time, was 6458 square feet. 2d. That the weight of the gun is marked 5579 lbs., and the sleds supporting it, together with

the timbers, lashing chains, wedges, blocks, &c., weighed, in all, 1624 lbs., one sled weighing as much as the other. 3d. That the horses and their sled were so far in advance, the pressure arising from this cause may be neglected, inasmuch as it did not act at the same time, and upon the same ice, with that arising from the gun.

Therefore, the whole pressure sustained by the 6.458 sq. feet of ice, at the same time, was equal to 5579 + 1624 lbs., or equal to 7203 lbs.; and admitting, what was very nearly the truth, that the pressure was distributed uniformly, and dividing 7203 by 6.458, we shall have, 1115.361 lbs., for the pressure sustained by each square foot; at all events, 1115.361 lbs. will be the *average* pressure sustained by a square foot of the ice.

From the observed effects upon the fifty paces of ice at the entrance of the creek, one can form a pretty accurate estimate of the *least* thickness upon which we can *safely* bring a pressure (of 1115.361 + 10) equal to 1125.361 lbs., (the ten additional pounds being the allowance for the covering sheet of water.) It is evident that the ice will *not be safe,* if its thickness be not above 5.56 in.

From the foregoing facts, which were obtained with the greatest care, it may be inferred, 1st, That a load may be transported with perfect safety over sound ice, eight inches in thickness, by distributing the entire weight of the system, so that each square foot (in contact with the bottom surfaces of the runners) shall experience a pressure of not more than about 1115 lbs. 2d. That a load *cannot be safely* transported over sound ice, 5.56 in. thick, when the weight is so distributed, that each square foot of surface (in contact with the bottoms of the runners) shall experience a pressure so great as about 1125 lbs.

FOR THE JOURNAL OF THE FRANKLIN INSTITUTE.*

Facts respecting the Meteoric Phenomena of November 13th, 1834. Communicated by Denison Olmsted, Professor of Natural Philosophy in Yale College.

FOREIGN TESTIMONIES.

1. By the Rev. W. B. Clark, A. M. F. G. S., &c. (England.)

"On the return, in 1834, of the period when the meteors were seen in 1799, 1832, and 1833, (and also in 1831, Amer. Jour., Jan. 1835,) I felt naturally anxious to watch the atmosphere. My health, however, did not allow me to remain up all night, but on rising at 3 o'clock in the morning of Nov. 13th, I saw from my window in fifteen minutes' time, by the watch, *fifteen falling stars*, in the direction of a line from Leo to the star Mirza, in Ursa Major. The night

* In order that our readers may understand the nature of the discussion in relation to meteors in 1834, we append to the following article, which has been transmitted to us for publication, three others, which have not before appeared in this Journal, from a previous number of the American Journal of Science.
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was cloudless, and the moon so bright, that the constellations could scarcely be seen; but the meteors were very red and brilliant."

Loudon's Mag. of Nat. Hist.

In vol. VIII. of the same journal, Mr. Clark, after having collected various accounts, says: "On the night of the 13th of November, there was a brilliant exhibition of meteors, from 11, P. M., of the 12th, to near daylight of the 13th."

2. From W. H. White, Esq. (England.)

"I have extracted the following observations from my journal, relative to the meteoric appearances on the morning of Nov. 13, 1834, which, I regret, were both accidental, and very limited, owing to the ill state of health I was in at that time. I have kept a journal of atmospheric and meteoric phenomena for some years, with the hope of deducing accurate conclusions on their origin, properties, and effects."

"*Extract.*—Finding myself unable to sleep, I arose at half-past one o'clock this morning, (Nov. 13, 1834.) The moon was shining with such peculiar brilliancy, that I was induced to take a survey of that portion of the heavens which my windows commanded, the north and east. After looking in the direction of Leo and Ursa Major for a few minutes, I observed a few small meteors, perhaps five or six, (I did not note the number;) but they presented nothing unusual in their appearance. I retired from the window about a quarter of an hour; but my interest in a subject at all times so highly gratifying to my mind, induced me to take another survey. I then saw, in the space of half an hour, ten meteors, all of them highly electrical, of a red colour, and very brilliant; they were without trains, or sparks, and most of them between Leo, Virgo, and Ursa Major. In a few minutes, another meteor, of a paler colour than any I had observed before, glided almost perpendicularly towards the earth; this was succeeded by another, of more brilliant appearance, which took a westerly direction. This meteor cast a brilliant blue light, and had a short, or truncated, train, which was of a paler light than the meteor itself, and gradually shaded off into a yellowish red; it appeared, in fact, like a stream of light, which the meteor, in its velocity, left behind. My health would not allow me to pursue these interesting phenomena longer, and I reluctantly retired to bed.—*Loudon's Mag.*

DOMESTIC TESTIMONIES.

From the St. Louis (Missouri) Observer.

"Mr. Editor—It was remarked in the last Observer, that nothing had been heard of the meteors here this year, although they had appeared at the east.

"On the 13th of November, at 5 o'clock in the morning, there was quite a display of meteors, or shooting stars, as they are sometimes improperly called. Happening to be out, at this time, I observed an unusual number of these meteors, and was immediately reminded of the celebrated meteoric display a year ago. I continued to gaze some fifteen or twenty minutes, and during that time saw perhaps

thirty or forty of these shooting bodies. The display was small, compared with that of last year; yet it was sufficient to render it an object of interest. The temperature, the stillness of the atmosphere, and the clearness and serenity of the sky, were very similar to the appearance last year." "L."

Bond county, Ill., Dec. 15, 1834.

2. From Charles B. Goddard, Esq., Zanesville, Ohio.—Addressed to Professor Silliman.

"Dear Sir,—On the morning of the 13th November last, a female servant in my family witnessed a meteoric appearance, similar to that so generally seen at the same period of 1833. It was not so extensive, nor did it endure so long. She communicated this to my wife on that day, and I questioned her respecting it I have no reason to doubt her veracity.—*Zanesville, Aug.* 12, 1835."

3. From Mr. A. K. Wright, member of the Theological Seminary, Andover, Mass.—Addressed to Prof. Olmsted.

"Dear Sir,—It may be interesting to you to know, that the meteoric exhibition was noticed here this year, as well as in other parts of the country.—*Andover, Dec.* 10*th*, 1834."

4. For the observations made at New Haven, and at West Point, see American Journal of Science, for January, 1835.

Remarks.

1. My respected friend, Professor Bache, has collected and published in the last number of this Journal, a long list of testimonies of those who *did not* see the foregoing meteoric exhibition, derived from sentinels at military posts in the United States. The preceding statements show that there were many, on both sides of the water, who *did* see it, as well as the New Haven observers. Sailors are better observers of *celestial* phenomena than soldiers. Stars must fall thick and bright, to surprise the vigilance of a sentinel in time of peace.

2. Whereas, the American Philosophical Society ordered it to be entered on their records, "that no unusual meteoric display was seen at Philadelphia on the 13th November, 1834," it is to be presumed that, with the impartiality expected from learned bodies, they will also record the fact, that such a display *was* seen at various other places, in both hemispheres.

Meteoric Observations made on and about the 13*th of November*, 1834. By A. D. Bache, Professor of Natural Philosophy and Chemistry in the University of Pennsylvania.

TO PROFESSOR SILLIMAN.

Sir,—On Saturday the 5th instant, my notice was drawn to a paragraph which I supposed to be from the pen of our mutual friend, Prof. Olmsted, calling attention to the Zodiacal light then visible for some hours before sunrise, and suggesting a query in regard to its connex-

ion with "Falling stars" and to a change in its appearance on or about the 13th of November. This induced me at once to commence a series of observations, which was continued until the 19th instant, and on the morning of the 13th, the number of observations and their duration were increased.

Having witnessed the remarkable meteoric phenomena of the 13th of November. 1833, and having been engaged during the summer, in conjunction with my friend Mr. Espy, in observing meteors, I felt competent, as far as experience could render me so, to the task which I had undertaken. The conclusions to which my observations have led, and in which I feel entire confidence, are, that *at the city of Philadelphia there occurred on the 13th of November*, 1834, *no remarkable display of meteors of the kind witnessed in* 1833, *and that there was probably no similar occurrence on those mornings which were clear just before and after the 13th inst.*

The observations upon which I base these conclusions are as follows:—

Sunday Morning, Nov. 9, 3, A. M. at Holmesburg. 10 miles N. E. from Philadelphia, I observed the Zodiacal light which extended as described (in the paragraph to which I have before referred) from the horizon, in an illy defined, nebulous light. The night was cloudless, and the moon had set. Wind S. W.

Monday Morning, Nov. 10, at Philadelphia. I observed at about 3 A. M. and again at 4 A. M., but there was a haze which obscured the zodiacal light. After the sun rose the sky clouded over. One very brilliant meteor to the west at the time of the second observation.

Tuesday, Nov. 11, was cloudy, and there was rain with the wind at S. W.

Wednesday, Nov. 12, about $3\frac{1}{2}$ A. M., a low stratus occupied the place of the zodiacal light. At $4\frac{1}{2}$ A. M. the sky was clear and the light brilliant, its general appearance as on Sunday. No meteors in S E part of the sky in 15 minutes.

Thursday, Nov. 13, 12*h* 10′ A. M. air 41° Fahr. Dew point $37\frac{1}{2}$°; sky clear. No meteors. Wind N W slight.

1*h* 5′ A. M. at the close of the observation. Air 40°, sky more hazy to W.

2*h* 40′a 2*h* 55′ A. M. Air $38\frac{1}{2}$, dew point 35, sky very clear, no haze. Three meteors in ten minutes looking to S E out of the way of the moon. Moon sets at 3*h* 49′.

3*h* 50′ to 4*h* 10′ A. M. Air 34°. The whole lower air is near to the dew point, and therefore hazy. The zodiacal light is obscured. Seven meteors in fifteen minutes. Moon has set.

5*h* 15′ a 5*h* 30′ A. M. Air 34°, dew point 31°. Twilight has begun. Five faint meteors in half a minute, and then very rare. Three after those five in about fifteen minutes.

The appearance of these five meteors in such rapid succession, impressed me with the idea that an unusual meteoric display might be about to commence or had commenced; the paths of three of these when produced seemed to meet nearly, two of them I could not bring

to the same point with the other three. After waiting some time for other meteors to confirm or refute the impression made as to direction, by those just referred to, a meteor passed considerably to the S of the zenith, its track, when produced, passing very much below the apparent radiant of the first three, and subsequently one to the north of the first three; its track passing also below the same point.

In reviewing the observations of this morning, the only remarkable occurrence of meteors is that noted between $5h$ 15′ A. M. and $5h$ 30′. But this was neither *in degree nor in kind like a portion of the meteoric phenomena noticed in November*, 1833. The lowest estimate which could be made with any probability of accuracy, of the number of meteors falling in half a minute in one third of the heavens, on the 13th of Nov. 1833, so far exceeds the number observed on this occasion, as to admit of no question in regard to the degree; and again, including the five which fell in rapid succession, there were but eight meteors seen in fifteen minutes, a number entirely insignificant when compared with the numbers which fell in that time a year since; and further there was not even a sensible uniformity in their rate of fall, since after those five were seen, but three occurred in fourteen and a half minutes. These meteors were not similar in kind, to those of Nov. 1833, for the paths of two of the five did not meet at what appeared to be the approximate radiant of the other three, and the tracks of two passed very much below this approximate radiant point.

These meteors were similar both in degree and kind to ordinary meteors. In the observations made by Mr. Espy and myself, we noticed frequently that meteors succeeded each other so rapidly that one observer could not *distinctly* trace their courses; sometimes appearing to come from the same point, at others in paths very variously directed. To a circumstance of this kind the five quickly succeeding meteors, two of which had not a common radiant point with the others are to be referred. In regard to the average frequency of eight meteors in fifteen minutes, as shown before half past 5 A. M. our observations made in the summer, and during the early part of the evening, when meteors are comparatively rare, have given six meteors in nine minutes and a half, five in ten minutes, four in ten minutes, &c. And this in about one fifth part of the sky to which we purposely limited our view, whereas on the 13th of Nov. my view was extended over at least one third of the hemisphere.

They were also similar in kind, their paths being in directions which when produced appeared to meet in very different parts of the heavens.

I continue the detail of observations, which are, however, from the generally unfavourable state of the weather, of inferior interest.

At 10 *P. M. on the* 13*th.* Air 46°, dew point $35\frac{1}{2}$°. Wind W. Light fleeces over the moon.

Nov. 14*th.* From about $3h$ 40′ to $4h$ A. M. a haze obscured small stars to about 20° from the horizon, those of 3d and 4th magnitude were however distinctly visible. Moon up. Two meteors in twenty minutes. At 4 o'clock the haze thickened and mottled clouds

(dark cumulus) came over from the west. Wind W faint. At about 8 A. M. began to rain. At $10\frac{1}{4}$ P. M. Rains, wind W and N W. Air 50°, dew point 45°.

Nov. 15*th*, 3 A. M. A white and very thick haze obscured the sky. 11 P. M. Snowing, air 24°, dew point $15\frac{1}{2}$°.

Nov. 16*th*. $3\frac{1}{2}$ A. M. Snowing.

Nov. 17*th*. 5 A. M. cloudy. At $8\frac{1}{2}$ A. M. Hailing, air 31°, dew point $23\frac{1}{2}$, wind N E.

Nov. 18*th*, $1\frac{1}{2}$ A. M. Raining.

Nov. 19*th*. $1\frac{1}{2}$ A. M. Sky clear, moon up, no meteors visible to S E in ten minutes. Horizon clouded. Clouds coming up from N W. 3 A. M. Sky covered with dark cumulus.

The foregoing observations are extracted from my journal, and the comments upon them are introduced for the sake of showing as far as is necessary the train of reasoning which has led to the conclusion stated in the beginning of this note.

It will be interesting to have information on this subject from different quarters of our country as having a direct bearing upon the explanation of the meteoric phenomena of last year.

Meteors on the morning of Nov. 13*th*, 1834. By Alexander C. Twining, Civil Engineer.

For a few days previous to Nov. 13th, of the present year, I was on the watch for extraordinary phenomena in the atmosphere and sky; without however observing more than this one, that on the morning of Nov. 9th, the zodiacal light was more brilliant in the east, than I remember ever to have seen it before. This was perhaps owing to the great clearness of the atmosphere. I noticed it at twenty minutes before 5 o'clock, A. M., and it extended at that time as high as the nebula in Cancer.

On the morning of the 13th I made observations in the open air, for a part of the time between one and two o'clock. Although I saw in the moonlight, one meteor of considerable brightness, I was satisfied very soon that nothing uncommon was visible at that hour and ceased observing. Again, soon after four o'clock, the moon having set, I took a station out of doors. At that time there was evidently an unusual number of meteors. They appeared, for the most part, lower in altitude than 30°; they might be seen in either quarter of the hemisphere; their colour was reddish, and their apparent magnitude very uniformly about that of the planet Mars. Their flights were generally not more than 8 or 10° in length; but one which passed nearly in my zenith, shot through as much as 20°. They were generally attended with trains of several minutes in breadth. Of these I observed but one that continued as long as three seconds. In the course of twenty-five minutes, as nearly as I could judge, I counted thirty of these meteors; and I estimated, from this time and number, and the portion of the hemisphere which my sight took in, that they were appearing at the rate of four in a minute.

Besides the meteors thus described, there were two or three which evidently formed a part of the assemblage. These were different from the first in their courses, crossing their paths at irregular angles and differing also from them in magnitude and colour, being very minute white points, precisely like the multitude of common shooting stars, without trains. But the meteors first described, which seemed to constitute the peculiarity of the scene, were not only alike in magnitude, brilliancy, and, as a general thing, in the intervals between their appearance, but their flights were evidently directed, like those of the meteors of 1833, from *a fixed point*; and not a single meteor that I saw, except the two or three stragglers mentioned above, deviated from this regimen. There could be no question, also, that this fixed point was in the constellation Leo, and was either in the same spot with the "radiant" of last year, or in the vicinity of it; but as no meteors described their paths very near to the constellation Leo, I was not able to fix the point within several degrees.

I have not formed a decided opinion whether this whole display is to be considered a slight recurrence of the meteoric phenomena of Nov. 13th, 1833, or not. It certainly possessed, on a greatly diminished scale, the same general character. There was, to say the least, upon this latter morning, such a regularity and *unity* in the assemblage of phenomena as, when coupled with the magnitude of the meteors, to give the impression of an uncommon and remarkable display.

The zodiacal light was all the time visible, about as high as the neck of "the Lion," but far less bright than on the morning of the ninth.

West Point, *Dec. 2d*, 1834.

Zodiacal Light.

My attention was first attracted to the appearance of the Zodiacal Light in the morning sky, on the 11th of October. At that time it presented a pyramidal form, resting its broad base on the horizon, and terminating in a faint indefinite extremity near the Nebula of Cancer.

On the 5th of November, I inserted in one of our daily papers, a brief notice of this light, with the hope of directing the attention of astronomers towards it. In the same article were suggested the queries, "whether this light has any connexion with falling stars, and whether it would sustain any remarkable change on or about the 13th of November?" The "change" contemplated was, that it would about that time pass by the sun, apparently, and become visible in the evening sky after twilight. It continued to be observed in the morning, (but not in the evening) until after the 13th of November. As soon after that time as the absence of the moon permitted observation, namely, on the 19th, the extreme parts of the same luminous pyramid were recognized in the west immediately after twilight; but, owing to the low angle made by the ecliptic with the western horizon at this time, the light was carried so near the horizon in the south-west as to have its distinctness much impaired. It could, however, be traced a little above the two bright stars in the head of Capricornus. From that time to the present, (Dec. 27th,) it has been seen on every

favourable evening, advancing in the order of the signs faster than the sun. On the evening of the 21st December, in a peculiarly favourable state of the atmosphere, it was faintly discernable, from six to seven o'clock, reaching nearly to the equinoctial Colure, and of course almost ninety degrees from the sun, measured on the Ecliptic.

This light has also continued to be visible in the morning sky, although evidently withdrawing itself to the other side of the sun. The presence of the moon at this time prevents observations in the morning; but we hardly expect to see it any more in the east for a few days to come, although possibly after transiently disappearing, it may re-appear in the morning sky.

On the morning of the 13th of November, there was a slight repetition of the *Meteoric Shower*, which presented so remarkable a spectacle on the corresponding morning of 1833. Supposing it probable that such appearances might be seen, I had concerted measures with several of my friends to watch for them. The following extract from the account of our observations, published the next day in the New Haven Daily Herald, will comprise the principal particulars worthy of notice.

"The presence of the moon in an advanced stage, until nearly 4 o'clock in the morning, permitted only the larger and more splendid meteors to be seen: it is fairly to be presumed that many of the smaller and fainter varieties, such indeed as constituted last year much the greater part, were invisible from this cause merely.

The writer was assisted in his observations by Mr. Tutor Loomis, and by one of his pupils, Mr. A. B. Haile, of the Senior Class. On carefully comparing notes, the following appear to be the principal points worthy of notice.

1. The *number* of meteors, though small, compared with last year, was evidently much above the common average. They began to be frequent as early as four minutes past one o'clock, *mean time*, when a fire ball of unusual size and splendor blazed forth in the east as a signal. From this period they were seen to fall at a pretty uniform rate, until the light of day was far advanced. From a quarter past two, until a quarter past five o'clock, we counted, in the eastern view, embracing one-third of the visible heavens, one hundred and fifty-five. Some, meanwhile, fell in the south-west, and a few in the north-west, but the number seen in the eastern hemisphere greatly exceeded that in the western. Were we to estimate the whole number which fell during the night at one thousand, we should probably not exceed the truth. After intervals of several minutes, three or four meteors would frequently make their appearance in rapid succession. In the eastern view, those south of the ecliptic, and those north, were nearly equal in number, being, for a considerable period, as twenty-seven to twenty.

2. The *directions* of the meteors were more remarkable than their number, and afforded more unequivocal evidence of the identity of the phenomenon with that of last year. They appeared, as before, *to radiate from a common centre*, and that centre was again in the constellation *Leo.* In whatever part of the heavens they fell, their

lines of direction, continued, would pass through that point. The attention of Mr. Loomis was particularly directed towards determining the position of the apparent radiant, having taken the bearings of a sufficient number of the lines of direction, and afterwards traced them on the globe. They meet near the Lion's eye, *Declination* 30° 15′, *Right Ascension* 144° 30′. The radiant point is, therefore, a little northward and westward of the place it occupied last year, which was near Gamma Leonis, Decl. 20°, R. A. 150°. This point was not observed to vary in position for at least three hours, thus corresponding to the conclusions which were made out respecting the radiant last year, a circumstance from which it was inferred that the source of the meteors was beyond the influence of the earth's rotation, and, consequently, beyond the atmosphere.

The meteors generally *fell* in the arcs of great circles, extending from the radiant point, but four were observed to *ascend* from it. One, at a quarter before four o'clock, shot from near Procyon, *towards* the radiant; and three were observed, at different times, moving with extreme slowness, horizontally, from west to east, south of Orion, and Canis Major.

3. The *Zodiacal Light*, which we have observed to precede the morning twilight on every favourable morning since the 11th of October, began to be visible as early as four o'clock, and was seen to extend from the horizon upward, terminating near the place from which the meteors emanated."

It will appear from the foregoing statements, that the phenomenon, if identical with that of November 13th, 1833, had nothing of the magnificence of that. Those, however, who have watched our sky for a long period, both before and after the 13th, concur in the testimony that the exhibition of meteors on that morning, in regard to number, brightness, and direction, was altogether peculiar, and more remarkable than any similar occurrence, before or since. We have not heard, however, that any remarkable fall of meteors was observed on that night any where *south* of this place, although the appearances, as observed by Mr. Twining, were extraordinary at West Point, (which is in nearly the same latitude,) and at places *north* of us, as at Andover, in Massachusetts. By the following letter, received since that time, from Mr. A. K. Wright, a member of the Theological Seminary at Andover, we learn, not only that the phenomenon in question was seen at Andover, but that a remarkable shower of meteors was witnessed in Ohio, on the 13th of November, 1831, which carries us back one year farther than any previous accounts. The statement of Mr. Wright is as follows.

"In a letter dated January 25th, 1834, which I received from my father, who is a physician in the state of Ohio, after some remarks respecting the meteoric exhibition in 1833, as observed in this country, and that in 1832, as observed in Arabia, I find a statement for substance as follows: 'In 1831, on the 13th of November, between three and four o'clock, A. M., I noticed an unusual shower of meteors, while on my way to a neighbour's, where I had been called on professional business.' Knowing the care with which my father's

professional journal is kept, I am satisfied there is no room for mistake, in respect to date.

"It may be interesting to you to know, that the meteoric exhibition was noticed here, this year, as well as in other parts of the country."

P. S. *Jan.* 1.—The Zodiacal Light is still faintly visible in the east. In the west, it reaches nearly to the meridian, but is feebler than at this time last year. Indeed, all its exhibitions have been less striking than they were in 1833-4.

D. Olmsted.

On Calcareous Cements. By James Frost, Civil Engineer.

No. II.

Whoever has taken the pains to examine the nature of calcareous cements, is aware that these useful and important articles differ exceedingly from each other in their character, and, consequently, in their value, as applied to particular purposes, although they are all formed, principally, of the same elementary substances. Thus, we have mortars which continue to harden for centuries, and become at length so indurated, as to excite universal admiration; and we are able, also, to form others, by similar combinations, which will become equally solid in a few months. We have mortars that will never harden under water, but which, on the contrary, will be dissolved and carried away by the current, although consisting of materials nearly identical with those which will, in the same situation, and under the same circumstances, become as hard and durable as stone; and, in fact, there is abundant reason to believe, that we now possess the means of forming a plastic mortar, which will soon become an artificial stone, equally durable with any known natural stone, and by means of which we may, with facility, transmit to our late posterity, busts, statues, or monuments, consecrated to the memory of those who may be deemed worthy of such distinction.

Although there have been many speculative attempts, we are not yet in the possession of any satisfactory theory, connecting and accounting for the numerous facts upon the subject, which are well and familiarly known to practical men, and which, as a perfect theory would do, will enable the artist and engineer to wield these elements at his will; but, on the contrary, we find, everywhere, that prejudice has usurped the place of knowledge, giving rise to severe disappointment and loss. In England, in consequence of the writings of Smeaton, and of Parker's discovery of that very valuable and useful article, the *Roman cement*, which ordinarily contains a very considerable portion of oxide of iron, practical men consider this metal as essential to a good cement, or mortar, and are thus induced to employ very largely, for architectural purposes, an article of an odious colour; although, in France, from the experiments and researches of *Vicat*, so copiously detailed in his *Recherches*, and also from the experiments of *M. Berthier*, published in the *Annales de Chimie et de*

Physique, iron is pronounced to be not merely useless, but actually injurious. There are some writers, also, who represent all the good properties of lime as resulting from its decarbonization, its subsequent recovery of carbonic acid, and its consequent return to its original state of limestone. The insufficiency of these theories, however, may be easily proved, for we can readily form cements of compositions, and in situations, the nature and conditions of which entirely contradict these assertions, or opinions.

From a consideration of the fact that some apparently slight variations in the manipulatory part of the process of making and using cements, produce very striking differences in the results, for which no adequate reasons have been given, it is manifestly necessary to re-examine the subject, and this I propose to do. In executing this task, it is my intention to state the results of all that I know respecting it, in a manner so clear and simple, that any person so inclined may, by direct experiment, satisfy himself of the accuracy of my remarks. I have had much experience on the subject, and have no interests, or prejudices, to warp my opinions; nor have I any other object, than, with an honourable and laudable ambition, to contribute my mite to the advancement of useful and practical science. In performing this task, it will be necessary to examine much that has been published on the subject, consisting of an intermixture of truth and error, and these I shall endeavour to separate.

Calcareous cement, taking the term in its full acceptation, includes every cementing compound of which lime is the basis. These substances, however, are susceptible of division into two distinct classes, and it will be convenient thus to separate them; they are the following:

First. Mortars, or those compounds of lime with other bodies, the lime in which slacks on the application of water, with greater or less facility.

Second. Cement, which also has lime for its basis, but so combined chemically with other substances, as to be incapable of slacking, on the application of water.

Lime, in common with most of the other substances used in mortars and cements, is a metallic oxide, its metallic base being denominated calcium. It is a protoxide, consisting of twenty parts of calcium, combined with eight parts of oxygen, in this state it constitutes what we call quick-lime, which still has an affinity for oxygen, and is probly capable of uniting to a double quantity. The other substances with which the lime is combined, are oxides, with different natural, or acquired, capacities for combining with oxygen, which latter agent seems, indeed, to be the connecting link in the chain of affinities.

FRANKLIN INSTITUTE.

Quarterly Meeting.

The forty-seventh quarterly meeting of the Institute was held at their Hall, October 27th, 1835.

THOMAS FLETCHER, Vice President, in the Chair;

JOHN C. CRESSON, Rec. Sec., P. T.

The minutes of the last quarterly meeting were read and approved.

Donations of books were received from George Bruce, Esq., of New York, Gerard Ralston, Esq., of London; William H. Keating, and George W. Smith, Esqs., of Philadelphia.

Donations of minerals were received from Messrs. John C. Trautwine, of Philadelphia, and Joseph George, of Pottsville, Penn.

Donations of models were received from Mr. L. V. Badger, and Messrs. Walker and Badger, of Portsmouth, N. H.

The Corresponding Secretary laid on the table the periodicals received during the past quarter, in exchange for the Journal of the Institute.

The Chairman of the Board of Managers presented the forty-second quarterly report of the Board, which was read, accepted, and referred for publication.

The Treasurer presented his report for the quarter ending Sept. 30th, which was read and accepted.

Mr. S. V. Merrick, from the committee, of the Board of Managers, on the extension of the accommodations of the Institute, presented their report on that subject, accompanied by plans of the new hall. The report was read and accepted, and referred for publication.

On motion, the resolution appended to, and recommended in the report of the Board of Managers, on the new hall, was unanimously adopted.

The architect of the new hall, William Strickland, Esq., explained the drawings, presented to the meeting by the committee.

On motion, the plan for the new hall was unanimously adopted, and the Board of Managers were authorized to take the necessary measures for its execution.

On motion of Wm. H. Keating, Esq., it was

Resolved, That the thanks of the Institute be presented to the President of the Institute, Mr. James Ronaldson, for his liberal donation of five hundred dollars, to aid in the erection of the new hall.

THOMAS FLETCHER, *Vice President.*

JOHN C. CRESSON, *Rec. Sec. P. T.*

Forty-seventh Quarterly Report of the Board of Managers of the Franklin Institute.

In compliance with the requisitions of the constitution, the Board

of Managers offer to their constituents an account of their proceedings during the past quarter.

The exhibition of domestic manufactures by the Institute, held at the commencement of the present month, was entirely successful. The display of articles then exhibited, was such as to excite a thrill of pride in every patriotic bosom. Many of the specimens, offered convincing proof that, in several departments of manufactures, our artisans are not behind those of any part of the world; and all displayed an improvement upon former years, strengthening the belief that, with proper encouragement, the highest state of perfection may be attained in every branch. The Committee on Premiums and Exhibitions are actively engaged in drawing up a report of the exhibition, and in preparing the awards of premiums, &c.; all of which will, in due course, be presented to the Society.

The Committee on Instruction have not been unmindful of their duties. The drawing school has been already opened, and with the encouraging prospect of a much larger class than last year. The committee have now under consideration, plans for increased accommodations for the school. The English evening school will open in a few days, under the care of Mr. Seth Smith; and the Board earnestly recommend this, and also the drawing school, to the patronage of the members of the Institute. If mechanics would offer as a reward to their best apprentices, a quarter's tuition in these schools, it is believed that great benefit would be conferred on the apprentice, without any real expense to the master, who would be more than repaid by the increased industry and attention of his apprentice.

The Committee on Instruction, having given attention to the resolution passed at the last quarterly meeting, on the subject of architectural lectures, have reported that, in their opinion, such a course would not be sustained by a sufficiently large and interested audience, but that they will invite, from competent persons, a few lectures on that branch.

The Library continues to increase, though not so rapidly as the Board could desire; seventy-two volumes have been added during the quarter.

The Journal of the Institute seems to be gaining in favour, and the Committee on Publications have thought themselves justified, by its more extensive circulation, to decide upon enlarging its size, after the present year, so as to increase its usefulness, and render it still more worthy of patronage.

The Committee on Explosions are advancing towards the termination of their labours. Their report of experiments, made at the request of the Treasury Department, is now in the hands of the printer, and will soon be laid before the Society.

The first Monthly Conversation Meeting, for this season, was held in September, and offered, as usual, many attractions.

One of the most important subjects which has engaged the attention of the Board, is the enlargement of the accommodations of the Institute. The committee of the Board, to whom this subject was especially entrusted, have been actively and laboriously engaged in ob-

taining plans for a building, and devising the means for its erection, on the lot in Chesnut street, recently purchased by the Society. The committee have finally reported a plan of a building, and a prospectus for a loan for the payment for the lot, and the erection thereon of the building; all which your Board recommend to the Society for their adoption.

The report of the committee, containing all the details relative to these matters, will be laid before this meeting.

All which is respectfully submitted.

Isaac Hays, *Chairman.*

Wm. Hamilton, *Actuary.*

Report of the Committee on the Extension of the Accommodations of the Institute.

The Committee appointed to extend the accommodations of the Institute, by the purchase of the Masonic Hall,

REPORT:

That they have performed the duty with which they were charged, and have made the arrangements preliminary to the transfer of the property. Various delays have occurred, owing to the absence of one of the trustees of the Grand Lodge, whose name was requisite to the execution of the deeds, but they are now ready for signature.

By agreement with the Grand Lodge, the purchase has been made upon the following terms, viz:

15,000 cash, on delivering the title deeds, and giving possession,
20,000 do. on 1st January, 1836,
25.183 33 do. 1st January, 1838,
25,183 33 do. 1st January, 1840,
25,183 34 do. 1st January, 1842.

110,550 dollars.

The last three instalments to remain subject to interest, at the rate of 5 per cent. per annum.

On the execution of the title deeds, the Institute will be in possession of a property daily increasing in value, and admirably calculated, if judiciously improved, to enable the Society to extend its beneficial influence to the widest limits, and especially to foster that important interest, the mechanic arts.

The Committee, in conjunction with William Strickland, Esq., architect, have devoted much time in devising a plan for a building, which shall yield a fair interest upon its cost, and, at the same time, afford ample accommodations for the lectures, exhibitions, schools, reading room, and other purposes of the Institute.

The result of their labours is now presented in the design prepared by Mr. Strickland.

It will be perceived by an examination of these plans, that while the principal front upon Chesnut street has been designed in a man-

ner which shall reflect no discredit upon the good taste of the members, the committee have not ventured upon an extravagant expenditure on mere ornament, of funds which may be more appropriately devoted to the improvement of the rising generation, but have studied neatness and simplicity in the architecture, and have endeavoured to make the whole building a substantial and useful structure.

The portions of the building devoted, in the main, to revenue, are,—

1st. Four commodious stores, fronting upon Chesnut street, $18\frac{1}{2}$ feet wide, by 60 feet deep.

2d. One spacious room above the stores, with an entrance from Chesnut street, in the centre of the building, 100 feet long, 60 feet wide, and 30 feet high to the cornice, to be used as the exhibition room of the Institute, and to be rented for similar purposes.

3d. In the centre of the lot, to be used also as an exhibition room, a hall 72 feet long, by 30 feet in width, having an entrance from Chesnut street, 19 feet wide.

4th. Five stores, or shops, upon Lodge street, suitable for mechanics' shops of various descriptions, each 16 feet wide, by 40 feet deep.

5th. The third story over the lecture room, on Lodge street, the whole size of the building, 60 feet by 100 feet, to be divided into suitable apartments.

For the accommodation of the Institute, the Committee have provided the following rooms, from which they will also derive some revenue.

1st. Two rooms upon the second floor of the centre building, each 30 feet wide, by 32 feet long, divided by a passage to the lecture room, to be occupied as the reading room and library, the cabinet, managers' room, and room for meetings; and two rooms on the third and fourth stories, 30 feet wide, by 72 feet long, to be used as model rooms, and for other purposes.

2d. One lecture room upon Lodge street, above the lower range of shops, 60 feet wide, by 100 feet long, capable of seating 1200 persons.

In reference to the unusual size of this room, it may be proper to state, that the Committee, considering the flourishing state of the institution, and the demand so often reiterated by the members for extended accommodation, have deemed it advisable to devote a large space to this object, and have made the room as large as can be easily filled by the voice of the lecturer.

The present lecture room of the Institute will contain about 500 persons; during the last season, the number of ladies' and minors' tickets issued was 478, thus excluding nearly all the members, now exceeding 1800, and their number rapidly increasing, from a participation of that instruction, which they have a right to claim. To meet the wants of the members, a room of the size provided is deemed indispensable.

3d. In addition, are provided four rooms; two under the elevated seats at the back of the lecture room, and two under them, on the

ground floor, 20 feet wide, by 40 feet long; these may be appropriated to the schools of the Institute, which are daily becoming more important, from their connection with its best interests.

4th. There are two smaller rooms, for the apparatus room, and laboratory of the lecturers.

Having thus laid before the meeting the general outline of the proposed plan, an estimate of the cost, and sources of revenue to enable the Institute to meet all demands for interest, without having recourse to its ordinary resources, will now be considered.

1st. The whole cost of the new building to be erected upon the Chesnut street front, and the alterations required in the Masonic Hall, as it now stands, to adapt it to the proposed plan, together with the purchase money to be paid for the property, has been estimated by Mr. Strickland, at $175,000

From this sum must be deducted the remaining three instalments due the Grand Lodge, in January, 1838, 1840, and 1842, at 5 per cent. interest, 75,550

Leaving the sum of $99,450

To be provided for by the Institute.

To meet this expenditure, the Committee propose to raise, by loan, the sum of $100,000, and to issue transferable certificates of stock, bearing interest at the rate of six per cent. per annum, irredeemable without the consent of the holders, previous to the year 1856, and for the security of the stockholders, to transfer the title on the property to trustees, and pledge for the payment of the interest, the faith of the Institute, together with all the revenues derived from the property when improved, and all money received from life memberships, donations, or bequests, not otherwise specially appropriated by the donors, and all money arising from the sale of ladies' and minors' tickets, to which may be added, the present available sinking fund of the Institute.

That this loan will be promptly taken, the Committee have not a doubt. Independently of the positive security offered in the property itself, upon which the whole amount will be expended, the stockholders will have additional security in the faith of a large and permanently established institution, embracing upwards of 1800 members, the value of which is now too justly appreciated for it ever to be allowed to languish.

The revenues applicable to the payment of interest, and gradual reduction of the debt, are estimated as follows:

1st. The hall now occupied by the Institute is its own property, subject to the interest accruing upon the former loan. All the receipts from it, therefore, are applicable to the reduction of the new debt, after satisfying the old claimants.

With a full knowledge of the value of this property, the Committee

estimate the rents available from it, after the Institute have ceased to occupy the parts of it now used by them, at	$2200
To this may be added, as annual appropriations, all monies received from the sale of ladies' and minors' tickets, and life memberships,	1000
And interest on the present sinking fund,	625
Making a total of	$3825
From which must be deducted, interest due to the old stockholders,	1218
Leaving available,	$2607

From the New Building.

Rents of four stores on Chesnut street,		$4000
Rent of a large exhibition room, including rent now paid at the exhibitions of the Institute,		2500
Rent of the large room in the centre of the building,		1000
Rent of the five shops on Lodge street,		750
Rent of the third story room on do.		300
Rent of the large lecture room, when not used by the Institute,		1000
		$ 12,157
Deduct 6 per cent. upon loan of 100,000 dollars,	$6,000	
Do. 5 per cent. upon debt due to the Grand Lodge, of $75,550,	3,777	9,777
Leaving the sum of		$ 2,380

To accumulate as a sinking fund, for the final redemption of the debt.

The sinking fund of the Institute now amounts to $12,500, which may also be added.

The Committee recommend the adoption of the following resolutions:

Resolved, That the Board of Managers be, and are hereby, authorized to borrow the sum of one hundred thousand dollars, upon the terms set forth in the subjoined proposal, to be appropriated exclusively to the payment of the first two instalments of the Grand Lodge of Pennsylvania, of the purchase money due for the hall in Chesnut street, and the improvements thereon.

Resolved, That for the payment of the interest, and the repayment of the principal, the faith of the Institute, together with all revenues derived from the property purchased,—from the present property of the Institute, after satisfying the claims of the old stockholders, and all revenues derived from life memberships, and the sale of ladies' and minors' tickets to the lectures of the Institute, and all legacies, or bequests, and donations, not otherwise specially appropriated by

the donors, be and are hereby pledged for the payment of the interest, and the final liquidation of the debt.

All of which is submitted.

Samuel V. Merrick,
Frederick Fraley,
Alex. Dallas Bache,
Alexander Ferguson,
William H. Keating,
John Struthers,
Isaac Hays, M. D.
Matthias W. Baldwin,
Thomas Fletcher,
} *Committee.*

Adopted by the Board of Managers, at a meeting held Oct. 28, 1835, and ordered to be submitted to the Institute.

Isaac Hays, *Chairman.*

William Hamilton, *Actuary.*

Monthly Conversation Meeting.

The second conversation meeting of the Institute, for the season, was held at their Hall, October 22d, 1835.

Mr. Isaiah Lukens exhibited an arrangement for a mercurial horizon, which was much admired for its neatness, compactness, and convenience.

Mr. Samuel V. Merrick exhibited and explained the operation of a gas-meter, such as will be used in the distribution of gas in this city.

Mr. R. Cornelius presented two branches for gas burners, of graceful form, and neatly ornamented, one of which was provided with an apparatus for collecting and carrying off the water generated by the combustion of the gas. The same gentleman exhibited a contrivance intended as a substitute for a waste cock to hydrants. This arrangement will be described in the next number of the Journal.

A wardrobe lock, which was opened by a key so small as to be contained in a common finger ring, was exhibited by Mr. Pretzman. The mechanism was much admired.

From Messrs. Carr & Lunt were received, 1st, a model of a hollow forge back for heated air, invented by Walker & Badger, Portsmouth, N. H. This is intended to be applied to the common smiths' forge, to supply a hot air blast from the heat usually expended in burning out the forge back. 2d. The model of a cupola furnace, intended for the use of the heated air blast, a patent for which has been taken.

Mr. D. Stevens laid before the meeting, the diploma of membership in the Institute, printed in colours,—a beautiful specimen of the art.

The model of a four oared barge, constructed by Mr. George James, of Philadelphia, and awarded to the Cleopatra Barge Club, was upon the table, and was much admired.

AMERICAN PATENTS.

LIST OF AMERICAN PATENTS WHICH ISSUED IN MAY, 1835.

With Remarks and Exemplifications, by the Editor.

1. For a *Washing and Wringing Machine;* John Snyder, City of New York, May 2.

The articles to be washed are laid upon a fluted concave segment board, contained in a trough, which segment board is borne up by spiral springs placed under it. A vibrating frame above the segment board carries a fluted roller, between which and the board the clothes are squeezed. Instead of fluting the board it is sometimes furnished with rows of small rollers turning on gudgeons, and the vibrating frame, instead of a roller, carries a fluted block. The wringing is to be effected by passing the wet clothes between two rollers borne against each other, the rollers being covered with blanketing, flannel, felting, or canvass.

The claim is to "the application of the spiral springs below, and the spring bars above, the articles intended to be operated on, whereby the operation of the roller and segment board, or convex fluted board and rollers beneath, will be powerful in proportion to the thickness, or magnitude, of the articles to be operated on between them. And I claim as my invention the combination and arrangement of the several parts, and methods, as herein substantially specified and set forth, and as the same operate for the purposes intended by me, and which said arrangement and combination constitutes my invention of certain new and useful improvements in machinery adapted to wash and wring personal and domestic linen, cotton, or other similar articles."

Washing machines, substantially the same with the foregoing, operating like it, by a vibrating frame and concave segment, furnished with flutes, rollers, and springs, have been the subject of more than one patent, and this, certainly, is an essential feature of the combination before us, or it has not any essential feature.

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2. For a *Truss* for Hernia; Philip Hittell, city of Philadelphia, May 2.

This is denominated "the improved common convex truss." The pad is to be made of wood, or other hard substance, and is to bear equally upon the ruptured and unruptured sides, being carved in such a form as to enable it to do so; and to adapt it the more perfectly to the parts, it is to be divided vertically, in the centre, and the two parts united by a hinge, or spring. It is assumed by the patentee that if pressure is made on one side only, this pressure tends to rupture the opposite side, an opinion not at all sustained by experience, or founded in reason. Trusses with double pads are well known to surgeons, and have been frequently worn where the actual disease was on one side only, and the patient was believed to be predisposed to rupture. A claim is made to "the principle of

equal pressure of the convex pad, carved or cast on a plate of any material whatever, united in the centre by a hinge, thereby making equal pressure," &c.

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3. For a *Machine for cutting Straw and shelling Corn;* William Denson, Centre Springs, Morgan county, Alabama, May 2.

The claim made is to "the combination of a straw cutter and corn sheller in the same machine;" a claim which we think altogether untenable. Will any one say that a patent can be sustained for spinning cotton and grinding scythes, by the power of the same steam engine? Yet a negative answer to this question, would condemn the patent before us, in which there is no pretence to invention; a straw cutter, and a corn sheller, are driven from the same shaft, this is all that is pretended.

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4. For an improved *Frame for Rail-road Cars, and other Carriages;* Heinrich Bachmann, Lancaster, Pennsylvania; an alien who has resided two years in the United States: May 2.

We are informed that by the plan here proposed Rail-road Cars may turn the small curves necessary in leaving the track for a warehouse, a yard, &c.; and that the lateral friction on the rails will be no greater upon any curve than on a straight line. We wish that this was true, but, unfortunately, the theory of the patentee is incorrect, and the plan by which he proposes to produce this useful effect is without novelty, its essential principle being well known, and repeatedly patented. The plan for causing the fore and hind wheels to adapt themselves to a curve, simultaneously, is the same with that upon which we remarked at p. 249, when speaking of Mr. Herron's patent, and to which, in order to avoid needless repetition, we must refer the reader. As regards the correctness of the theory, let it be remembered that when the fore wheels of a car pass from a straight road on to a curve, the hind wheels are still upon the former, and that by the plan proposed they are adapted to a curve at which they have not yet arrived, and will, therefore, have to grind their way to it. The patentee proposes to place the hind and fore wheels ten feet apart, which will greatly augment the evil that he imagines he has removed.

As in turning curves the opposite wheels must move with different velocities, the patentee uses a separate axle to each wheel, thus admitting of this difference of motion; there is no more novelty in this than in the other parts of the plan. Separate axles have been repeatedly used; and the same effect was produced, many years since, by leaving one wheel on each axle loose, so that, when necessary, it could turn upon it in the ordinary way.

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5. For a *Washing Machine;* Philo Hunt, Sharon, Litchfield county, Connecticut, May 2.

Two grooved cylinders are to cross a trough near its upper edge,

one of which cylinders is to be borne up against the other by springs; between these the clothes are to be passed by the turning of a winch. A washing machine, identical with this, was described by us two or three years ago; we could easily give day and date, but do not think it necessary to turn to the book on the present occasion.

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6. For a machine for *Cutting Bungs, &c.;* George D. Gates, Hartford, Connecticut, May 2.

A shaft is to revolve vertically, having a collar like a lathe mandrel; this is to carry steel cutters fixed in an iron hub, or chuck, and the timber from which the bungs are to be cut, is placed beneath it on a bench made to slide up against the cutters. The claim is to "the application, by pressure, of a piece of board, or timber, against revolving cutters, until the same is cut through."

Round pieces of wood, from the size of button moulds to articles of a much greater diameter, have been cut by *pressure against revolving cutters*, time out of mind, yet it is the doing this, and not the machinery by which it is effected, that forms the claim.

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7. For a *Printing Apparatus;* Josiah Warren, Warwick, Tuscarowas county, Ohio, May 2.

The object of this invention, we are informed, "is to simplify and cheapen the printing power so as to adopt it to the condition and capacities of *private citizens*."

We do not think that the inventor has succeeded in his object, either for "private citizens," or for *public characters*, as his "simplified printing apparatus" is much more complex than others which have been before made for the same purpose. For "private citizens" we should prefer the old fashioned balls to the inking rollers, and the making register by means of the frisket to the plan now proposed. The description of the machinery, as given by the patentee, is much involved, and we shall not attempt to clear it up; the claim also is indefinite, being to "the above described apparatus for inking, registering, or placing the sheet, and giving the impression in printing. Particularly the arrangement and combination of the parts, and their application to commodious or ornamental articles."

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8. For a *Water Wheel;* Thomas Pierce, Hartwick, Otsego county, New York, May 2.

This is called "an inclined water wheel, and a horizontal rotary wheel for propelling the same." The water from the head is to descend through a vertical flume, or trunk, from the lower end of which there is a horizontal duct leading to the horizontal wheel, and striking its periphery, which is furnished with oblique floats or buckets, and is contained within a curb. A second trunk or flume ascends from the former to the surface of the water in the tail race, the wheel being represented as placed at a considerable depth. The shaft of the wheel, by which machinery is to be driven, rises through this last trunk. All this we think a very bad arrangement, but if

the patentee can effect what he proposes, he will more than make up for any trifling defect, as, when there is a fall of thirty feet, for example, he proposes to place three such wheels in succession, each of them to have the full pressure of twenty feet, and thus to "gain power." As his reasoning upon this subject is contrary to all reason, and occupies more space than we have to spare, we shall postpone the further consideration of the affair until some new laws of nature are enacted.

9. For *Cutting Comb Teeth;* Samuel Adams, Redding, Fairfield county, Connecticut, May 2.

An apparatus is described by means of which the teeth of combs are to be cut by applying power, instead of manual labour. The apparatus presented we can understand, so far as it goes, but as the mode of applying it to the cutting of comb teeth, or of any thing else, does not appear, we are really in the dark upon the main point, and, therefore, have nothing to communicate.

10. For a *Machine for Stiffening Hat Bodies;* Henry Blynn, Newark, Essex county, New Jersey, May 9.

Two wooden rollers, two feet three inches long, and four inches in diameter, are placed horizontally, and geared so as to revolve together over a trough containing the stiffening; this trough has a partition dividing it into two parts, and has in it two kinds of stiffening, one adapted to the crown, the other to the brim. The crown is saturated by immersing it in the proper compartment, and then passed up between the rollers to equalize the stiffening, and to squeeze out that which is superfluous, after which the brim is similarly treated. The drippings are in each case, conducted back into the proper compartment. It is said that "in this way the stiffening is much more equally distributed through the hat than it can be done in the usual way by hand, and in much less time."

11. For a *Churn;* Michael Knight, Pownall, Cumberland county, Maine, May 3.

This is a double dasher churn, the levers, and other appendages for working the dashers, being constructed in such a manner as to be adjustable, as will appear from the following claim:

"I claim as my invention the wheel, with the power it gives to lengthen and shorten the sweep; the bars connecting the sweeps which give to the machine a steady motion; and also the construction of the dashers, by which I can lengthen and shorten them so as to conform to the quantity of cream to be churned."

12. For *Throwing and Twisting Silk;* Lucilius H. Moseley, Poughkeepsie, New York, May 9.

(See specification.)

13. For a *Washing Machine, and Churn;* John B. Mitchell,

and Sylvanus Fairbanks, Roadfield, Kennebec county, Maine, May 9.

All that we shall offer respecting this machine, are the claims, which are the following.

"Claims. 1st. The application of cams for pushing, or putting into operation, stocks for washing machines, fulling mills, tanners' mills, for softening hides, churns, &c.

"2nd. The application of the fluted wash board to the lids of the washing machine."

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14. For a *Machine for sifting and cooling Grain and Berries;* Martin N. Armstrong, and William H. King, City of New York, May 9.

Two wire screens, an inner and an outer, are placed concentrically, and revolve upon horizontal axles. The grain, &c. to be cooled or sifted, is admitted between the two cylinders by a door extending along the outer cylinder. Within the inner cylinder there is a revolving fan, and another below the outer cylinder, which conjointly blow upon the article contained between the two screens.

The description is extremely verbose, partaking largely of "the said" and "aforesaid" style of a special pleader; we should have been spared much trouble had the specification been sifted, or winnowed, and the grain only deposited in the patent office. The driving machinery consist of bands and wheels, and possesses no novelty. We give the claim.

"And we, the said Martin N. Armstrong, and William H. King, do say and claim, that we are the joint and original inventors of the machinery hereinbefore described and set forth, for the purposes hereinbefore set forth, except only that the said cylinder hereinbefore described, hath been heretofore known and patented, without the opening or sliding cover hereinbefore mentioned and described, but with openings in the ends or extremities thereof; and except also that fans, frames, cases, pulleys, shafts, cranks, hoppers, connecting straps, or other component parts of the said machinery, hereinbefore described and set forth, may have heretofore been used separately; but we say and claim, that we are the joint and original inventors of the combination and uses of the said component parts, for the purposes aforesaid, as hereinbefore described and set forth."

It may be worth enquiry whether "the said cylinder" which "hath been heretofore known and patented," but with openings at the ends instead of on one side, if not free to be used by the patentee, would become so by merely changing the place of opening.

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15. For a *Spring Fleam for Bleeding Cattle;* Cornelius Adle, Winthrop, Kennebec county, Maine, May 9.

The cutting part of this instrument is a separate piece, which is made to fit into a mortice on the end of a straight spring, where it is confined by a screw, by which its length may be regulated. The body of the instrument is a flat bar, or blade, with a handle, resem-

bling a spatula. A mortice, or slot, is made through this, to allow the point of the fleam to pass through; the straight spring is fastened on one side of this blade, and is held up by a trigger, upon withdrawing which the fleam is forced down through the slot, which is placed immediately over the vein.

"What I claim as my invention, is the construction of the instrument, and the manner in which the fleam is gaged, set, and propelled, or driven, into the subject operated upon."

For some remarks upon spring lancets, with a guard, see vol. ii., p. 235.

16. For a *Washing Machine;* Jacob Sager, Harrisonburg, Rockingham county, Virginia, May 9.

The clothes to be washed are placed within a revolving cylinder, the circumference of which is formed of round bars standing at a suitable distance apart; the revolving cylinder is contained within a tight barrel, or case. The clothes are to be hung round certain bars in the cylinder, which bars are placed somewhat nearer the centre than the others. There are other bars passing from head to head, say at four equidistant points, to increase the agitation, and what the patentee calls swing gates, to prevent the clothes from falling through between the bars. We do not perceive any thing in this washing machine to protect it from the fate of the thousand and one instruments for the same purpose which have seen their day, and have ascended, or descended, into the lumber room, or the cellar. We shall not offer any further particulars.

17. For a *Cooking Stove;* William Resor, H. B. Wade, and R. P .Resor, Cincinnati, Ohio, May 9.

This is called a double reflecting cooking stove. The body of it is to be a metallic box, which is to stand upon four legs: its appearance in the drawing very nearly resembles that of a double desk, the two sloping sides being hinged in the same manner. in order to give access to the interior; the form of the bottom is the same with that of the top, two of its sides being made to slope in the same manner, for the purpose of reflecting the heat upon the articles to be cooked. The fire place passes along the middle of the box, occupying the space which would be under the horizontal part in a double desk. This horizontal part is open, for the purpose of admitting pans, kettles, &c. to stand over the fire, and from it also ascends the smoke flue. The box, or stove, which contains the fire, is made to lift out, together with its grate, ash pit, &c.

Along one of the chambers of the box, there is a spit, and into the other may be put articles to be baked, &c.

The claim made is to the particular arrangement and construction of this stove, for cooking by reflected heat, but not to the cooking by reflection, excepting in an apparatus constructed like that described.

18. For a *Thrashing Machine;* Stapleton C. Sneed and Wm. B. Carpenter, Albemarle county, Virginia, May 9.

The manner of fastening the spikes into the wood of the cylinder and concave appears to be the thing which these patentees suppose to be an improvement, although they have not said so distinctly, or made any claim; but in all other points this machine is like a hundred others.

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19. For an improvement in the *Damask Loom;* Patrick M. Gilroy, Warwick, and Abner S. Tompkins, North Providence, Rhode Island, May 9.

This improvement in the damask loom consists in the application of water, or other, power to drive it. The general arrangements by which this is effected resemble those of the ordinary loom, but, of course, so varied as to adapt them to the purpose in hand; the treadles are worked by cams, just in the same way, and one also is used for operating upon the cylinder, or apparatus, by which the pattern is given; or a perpendicular lever with a pulley on it, for the large cam to bear on, may be used. In either case, the large cam is connected with the back harness by means of levers and rods, and weights to govern them.

The claim is to "the combination of machinery constituting the application of power to drive the damask loom, and particularly the large cam, and large treadle; or the lever and pulley as a substitute, and the two small cams on each end of the bottom shaft."

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20. For a *Diving Apparatus;* John W. Fraser, Boston, Massachusetts, May 9.

From some cause, the patent above named has not actually issued, although it is entered upon the list; we must, therefore, delay our notice of it until it has passed the seal.

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21. For a *Saddle Seat Spring;* Marshal Baylis and William Brannon, Fredericksburg, Spottsylvania county, Virginia, May 16.

A thin box, or case, is made of such length and width as will allow it to be contained within the seat of a saddle; this case is open at one end, and within it is inserted a steel spring, which is bent backward and forward, in a zig zag form, and extends nearly the whole length and width of the case. This spring is so placed within the case, that the webbing of the seat is strained from the pummel of the saddle to one side of an iron rod which surrounds the spring, and projects out at the back end of the case, so that the weight of the rider will cause a pressure upon the zig zag spring. The claim is to "the combination and arrangement, consisting of the serpentine or waved spring; the manner of securing it down, by means of the bent ends of the rod, and the case, as described, to contain these parts."

22. For a *Stove for Warming Rooms;* Charles W. Peckham, New Haven, Connecticut, May 16.

This is called a *reverberating stove*, and it is so called because the draught from the fire may be made to descend between plates on one side of the stove, to its lower end, or base, and then to ascend between plates on the opposite side, leading to the smoke pipe. When the fire is first lighted, the draught to the pipe is direct; but after the ignition is perfect, a valve closes this opening, and the reverberation necessarily takes place. The following are the claims.

"I claim as my invention and improvement, the shape and construction of the base, and its connexion with the body of the stove, as above described, by means of which the whole of the fumes may be made to pass through its extensive chamber, without interruption, diffusing heat from all parts of it.

"I also claim as my invention and improvement, the shape and construction of the body of the stove, as above described, by means of which the reverberation of the fumes is carried round the stove in flat pipes, or conductors, thereby exposing more surface for the diffusion of the heat than could be obtained from round ones containing the same matter."

So far as reverberation, and the consequent diffusion of the heat from the lower as well as from the upper part of the stove, are concerned, the analogy between this and Spoor's stove is complete; the alteration of the draft from direct to circuitous, is also perfectly similar; the aim and the means in both we think substantially identical. We refer the reader to p. 200 of vol. xiv., and to p. 81 of the present volume, for our notice of Spoor's stove, as originally described and claimed, and also as described and claimed in an amended specification.

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23. For a mode of *Making Hats, Caps, &c., and Stiffeners for Neck Stocks;* Elisha Pratt, Cambridgeport, Middlesex county, Massachusetts, May 16.

This patent is taken for giving a coating, to the articles named, of a composition in which India rubber is the principal ingredient. The articles combined are to be placed in a *friction mill*, "which mill," says the patentee, "I claim as my invention," and a particular description is given of it, but no drawing is furnished, a circumstance which, we apprehend, would invalidate the patent, as it is a neglect of a special and absolute requirement of the law.

The friction mill is a pot, or vessel, of iron, or other material, in which a vertical shaft revolves, and carries knives, which pass between others fixed in the vessel, in the manner of a pug mill. The following ingredients, in the proportions named, are to be put into this vessel,—100 lbs. India rubber, 5 lbs. sp. turpentine, 8 lbs. asphaltum, 2 lbs. spermaceti, 1 lb. pearlash, 4 lbs. litharge, and an equal quantity of Vandyke brown, and sugar of lead. These are to be acted upon by the mill, until they are perfectly incorporated. We are

told, however, that much art and care are requisite in the process, and much judgment required in proportioning the ingredients.

Although these several substances are named, it appears that the useful effect depends upon the India rubber, as we are informed that this compositton "will *lubricate* (?) freely, when applied to the uses hereinbefore mentioned, and form a thin coating, which will adhere firmly to the substances to which it is applied, and will harden and become tough on exposure to the atmosphere, when, in fact, from the evaporation of most of the several materials used in said composition, the rubber is restored to its natural state, or a state nearly resembling it." In the olden time, every one of the articles used, with the exception of the spirits of turpentine, would have refused to evaporate, and that with the most persevering obstinacy, even at a high temperature. If, by remaining behind, they really improve the water proof stiffening, it is well that they do not fly off, as supposed; we do not, however, believe that this composition will be superior to others which have been made, by combining the solution of India rubber with colouring matter, and with earthy and other ingredients.

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24. For a *Water Wheel;* William Merrell, Randolph, Portage county, Ohio, May 16.

This is a reaction wheel, but certainly not an improvement on some previously in use. The water is to enter on the upper surface of the wheel, and to flow out at the periphery; but it appears that it passes into the spaces between each of the curved buckets, through separate openings, there being a solid hub of two feet diameter in the centre. There is no claim.

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25. For a *Machine for Hulling Cotton Seed, &c.;* James Martin, Petersburg, Dinwiddie county, Virginia, May 16.

This machine operates by means of stones, running like mill stones, but furrowed in a way particularly described in the specification. These stones are made adjustable, and may, when desired, be used for grinding corn, by causing them to approach each other sufficiently near for that purpose. The hulled seed falls into a circular trough, that surrounds the lower stone, to which a brush is attached, which, sweeping round the trough, carries the seeds and hulls round to a spout through which they fall, and are carried to be riddled and cleaned.

The claims are to the combination of the respective parts by which they are adapted to the purpose set forth; to the manner of feeding by pins, set spirally on a vertical revolving rod; and to the circular trough and brush, or brushes, for collecting the seed in the manner described.

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26. For an improvement in the *Manufacture of Salt by Solar Evaporation;* Edward C. Cooper, city of New York, May 16.

An inclined plane is to be formed by properly preparing the ground, and covering it with a coating of hydraulic cement, and

down this plane the water to be evaporated is to run, there being proper receptacles for it at the bottom. To cause it to be distributed properly over the plane, the latter is to be covered with gravel to the depth of one-fourth of an inch. The water is to be pumped into a reservoir at the head of the plane, and from this it flows into a regulating tub, and distributing logs, furnished with perforations; means being adopted, by the employment of valves and floats, to regulate the supply.

The claims are to the application of an inclined plane, as described; to the regulating tub, valves, and floats; to the equal distribution of the water by means of gravel; and to "the successful application of a cemented water-tight surface upon a natural soil, by means of coating the same with hydraulic cement, as hereinbefore described."

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27. For a *Reaction Water Wheel;* John B. M'Cord, Galena, Daviess county, Illinois, May 16.

The description of this wheel is given in very general terms, and we cannot find any thing in it by which to characterize it. No part or portion of it is claimed.

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28. For an improvement in *Carriages, and other machinery with Wheels;* John Williams, and John Wing, Hartford, Hartford county, Connecticut, May 16.

The so-called improvements are very obscurely described in the specification, and very imperfectly represented in the drawings, the whole being the very reverse of "full, clear, and exact." It seems, however, that the main novelty is one of great antiquity, namely, the application of friction wheels above the axles of the main wheels. The patentees say, "We claim as our invention, only, wheels framed into the side of carriages to tread on the axles of carriages, or revolving between standards for the gudgeons, or drums, and wheels, to roll in; and the extra neap and shaft, to be applied as specified; and also a case for the forward axle to roll in."

It is a little strange that men living in the centre of machinery and manufactures should suppose themselves to be the inventors of friction wheels, which have been frequently applied in the way proposed, and as frequently abandoned.

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29. For a *Capstan;* Calvin Oaks, Rochester, Monroe county, New York, May 16.

This is a very ingeniously contrived and well arranged capstan, and so far as we can recollect, it possesses a sufficient portion of novelty. The drum head of the capstan is separate from the barrel, and fits on to the square end of a stout shaft which is round below this part, and passes through the barrel and deck, into a step on the lower deck. The drum head may be secured to the barrel by bolts, or pins, and when this is done the levers inserted into the holes in the drum head, turn it as a common capstan; at about the middle of this shaft, and just above the level of the deck there is a pinion fixed

which may be seven inches in diameter. The stool of the capstan, which is furnished with palls, as usual, contains a hollow wheel of two feet nine inches diameter, having teeth on its inner edge, on a level with those on the pinion. A spur wheel of about a foot in diameter, may be made to fall into gear with the two former, or may be depressed so as to fall into a hollow in the deck, a lever adapted to that purpose being attached to the deck.

When the capstan has been used in the ordinary way, and more power is required, the pins connecting the drum head and barrel are removed, the intermediate wheel below is thrown into gear, and upon turning the drum head, the barrel will be moved in a reverse direction, with a power greatly increased, as may be readily calculated. The claims made are,

"1st. The separate drum head with the square hole through it, fitted to a square portion of the main shaft, and the screw and nut to keep it down, as described.

"2nd. The connection pins, or bolts, for the use described.

"3rd. The journal and small spur wheel on the shaft, with the manner in which the second spur wheel is arranged with it, to play into, or out of, gear, and continue the motion to the next.

"4th. The manner and application of the large rim wheel, and for the intent described.

"5th. The arrangement of the lever, and connection with the axle of the second spur wheel, for the end described."

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30. For improvements in the *Making of Rovings, spinning and doubling of cotton, silk, flax, and other fibrous substances;* granted by special Act of Congress, to James Jones, of Salford, near Manchester, England, May 16.

These improvements were made the subject of a patent in England, which was sealed on the 25th of May, 1833, and a description of them, with a plate, may be found in the "London Journal of Arts and Sciences," (Newton's) vol. 5, conjoined series, p. 113. As the English and American specifications appear to be identical, we shall quote a few lines from that journal relating to it.

"These improvements consist in certain arrangements of machinery, by which the bobbins and flyers are driven, or made to revolve, at speeds differing from each other, in order to cause the yarns, after being spun, to be taken up upon the bobbins with a certain tension."

"The first feature of the improvement is a contrivance designed to drive the flyer with a speed very considerably greater than that of the bobbin; the second is a mode of driving the bobbin faster than the flyer; and the other improvements are modifications of the same principles."

After describing the various modifications of the apparatus, by reference to the drawings, it is stated that "The patentee claims, first, the adaptation of the rotary wheels, or pulleys, for giving the increased speed to the disks which carry round the flyer, or the bobbin independently of the spindle; secondly, the tension band passed

round a pulley, for regulating, or tempering, the drag of the bobbin; and thirdly, the two flyers acting conjointly, as described."

The causing the flyer and spindle to revolve independently with different and regulated velocities has been the subject of more than one patent. It makes a part of that noticed in the last number, as granted to Jackson, Potter & Miller, p. 310; and the same thing had been previously effected, by machinery differently arranged. Whether that under consideration, presents any advantages over those methods to which we allude, is a question which practice must decide, we, however, are of opinion that it does not possess any superiority.

We do not perceive any thing in the present invention which gives to it any claim to that special legislation by which it has been distinguished above the general class of foreign inventions; although we see no valid objection to the giving to foreigners, under proper restrictions, the right to obtain patents in the United States, inasmuch as Americans have this privilege extended to them in other countries.

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31. For a *Thrashing Machine;* Washington F. Pagett, White Post, Frederick county, Virginia, May 24.

A long description is given of this thrashing machine, which we shall cut down by inserting the claim only, which is to "the arrangement of the spring and friction roller to allow of the receding motion of the concave; and also the construction for obtaining the same end by means of the long arms, to apply a weight for the purpose. The manner of constructing the cap for the purpose of adjusting the main, or any other shaft."

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32. For a *Lath Machine;* David M. Cradit, Ithaca, Tompkins county, New York, May 24.

A circular saw is made to revolve on one part of a bench to cut off the boards, from which the laths are to be made, into proper lengths, and a knife, four feet six inches long, is employed to cut the laths at a single stroke. The description of the machine, and the drawing by which it is intended to be represented, do not, together, afford a clear idea of the manner in which it is to made to operate. We are informed that "the object of the machine is to manufacture laths of an equal, uniform and proper width, for the lathing of buildings," but there is not any thing claimed as new. A patent was obtained three or four years ago, for a lath machine in which a long knife, similar to the foregoing, was made to cut laths from plank, in a similar way.

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33. For a *Pump;* Philo C. Curtis, Utica, Oneida county, New York, May 24.

The liquid to be raised is to be forced up by pumping air into the vessel containing it, which may be a barrel in a cellar, or a closed vessel contained in a well or other reservoir. The pump barrel is placed upon a suitable stand, and has two valves at its lower end, one

opening inwards to admit air, and the other opening outwards to allow the air to be forced through a tube into the upper part of the vessel containing the liquid. From the lower part of this vessel there is an ascending tube, to carry the liquid to the point of delivery. There is a cork in the first tube, near the pump barrel, to allow the air to escape from the vessel in a well, &c., that it may receive a new supply of water through a valve on its lower side, opening inwards.

"What I claim as my improvement, consists principally in arranging the parts in a form that water or other liquid can be raised advantageously without entering the body of the pump, by means of a vessel as above described, and a tube leading to the same, from the pump, provided with a cork to enable the person working the pump to fill and discharge the vessel with air and water alternately. I also claim as my improvement the solid metal piston."

There is but little novelty in the arrangement referred to, and there is none in the solid metal piston; air pumps having been repeatedly made with such pistons; and we will venture to assert that the patentee will not manufacture many such, in which case he might have omitted this part of the claim without a risk of loss.

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34. For *Increasing the adhesion of the hind wheels of Locomotive Engines;* Charles and Geo. Escal Sellers, city of Philadelphia, May 22.

A patent was obtained by Mr. E. L. Miller, on the 19th June, 1834, (see p. 48, vol. 15) for a method of obtaining a similar end, by throwing the weight of a car, or tender, on to the hind part of a locomotive engine. The present patentees effect the object by "so coupling, or connecting the cars containing the load to be drawn, to the body of the locomotive engine, as that the load by its action upon a lever, or standard, shall tend to raise the fore end of the locomotive, in any desired degree, and thus to lessen the pressure upon the fore, and transfer the same to the hind wheels."

The patentees say that they "do not mean to limit themselves to any particular form or manner of constructing the parts concerned in producing the intended effect, but claim as their invention the connecting to a Locomotive Engine, the load which is to be drawn by it, in such a manner as to throw a larger portion of the weight of the locomotive upon its hind wheels than they are ordinarily intended to sustain, in the manner, or upon the principle hereinbefore set forth."

It will be readily seen that the coupling bar, or jointed rod, by which the car is attached to a locomotive, if attached to it at a point considerably above that by which it is attached to the car, will tend to lift the latter, and to draw down the former, and thus to increase the adhesion of its hind wheels.

35. For an improvement in *Mills for Sawing Stone;* Joseph L. Dutton, city of Philadelphia, May 22.

This patent is taken for the particular construction of the building in which the sawing is to be effected. In the first place, the floor of the mill is to be raised to such a height from the ground "as to be on a line with the bed of the log or marble teams, by which means most of the expense incurred by unloading, and reloading, is saved." On this elevated floor are placed several short transverse railways, upon which run cars to which the blocks of stone are transferred, immediately from the common teams, and by which they are supported during the operation of sawing.

Above the before mentioned railways, the frame work of the building supports other railways upon which also there is a car furnished with a screw, by means of a chain dependent from which, a block of marble may be suspended and transferred to any part of the mill where it may be wanted. A crane is likewise constructed, which sustains a car similar to that last described, for aiding in the transfer of the stone from one part of the building to another. The arm of this crane is supported upon friction wheels, running upon a suitable curved way, erected for that purpose.

"I claim an exclusive right to the raising of the mill floor, as above described. The traversing car. The application of the upper car to saw mills. The crane whether applied to saw mills, or for any other purpose; and the regulating spring of the saw slides."

We think that the foregoing claim is very susceptible of improvement. The mere raising of the floor, for the purpose pointed out, we do not think new in saw mills, for we err greatly if we have not seen, in Philadelphia itself, a mill, for sawing mahogany, with the floor so raised "as to be on a line with the bed of the log" carriage. Nothing is said about any novelty in the traversing car which is to receive the stone, nor do the upper cars differ from such as have been used for raising and transferring loads, for other purposes. The crane is claimed, "whether applied to saw mills, or for other purposes," now this assuredly does not mean a crane generally, yet we are not told in what particular this crane differs from others; a thing that should not be left to be inferred, but which ought to have been particularly specified. The fact is that the novelty and utility of the structure consist not so much in the formation of its individual parts, as in the general arrangement and combination of the whole, by which it is adapted to the attainment of the object proposed, and upon this the claim to invention must mainly rest.

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36. For a *Kitchen Boiler;* John and William C. Bailey, Farmington, Kennebec county, Maine, May 22.

A cylindrical metal boiler five or six inches in diameter and twelve inches long, is to be let into the back of the chimney, just above the fire, so that one side of it will be exposed to its action. This boiler is to be entirely closed, excepting where a tube enters it, by which it is to be filled with water, and is to supply heat to

that contained in a wooden cistern. This tube is to pass through the jamb, or in some other way to be conducted into the aforenamed cistern, which, being filled with water, will supply the boiler after the heat has expanded, and driven off the air from the latter. The water from the boiler is then to heat that in the cistern, which is to be employed for washing, steaming, or other domestic purposes. The cistern is to have a close fitting lid, to confine the steam, when necessary, and the specification contains directions for its use in various ways; the whole scheme appears to be considered as new, as there is no claim made; similar, but much better, contrivances, however, are well known; the present would be condemned, were there no other defect in it than the impossibility of cleaning out the boiler, but it is, in other respects, essentially imperfect in its arrangement.

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37. For an improvement in *Paddle Wheels, and in the Propelling of Canal Boats;* Benjamin M. Smith, Rochester, Monroe county, New York, May 22.

The floats of the paddle wheels, instead of being of one continuous surface in width, are to be divided into three or more parts, which are to be placed one behind the other, like the treads of steps, a sufficient width being given to each arm for that purpose. The direction of the wheel, when in motion, is such that the inner width of the paddle is in advance of the others. The patentee thinks that "the advantages of this arrangement are, that when the wheels are put in forward motion, the lateral pressure, or force, is much diminished, and the useful effect is very materially increased over wheels of the ordinary construction, chiefly owing to the floats lifting less water as they approach, or rather leave, the surface."

One main difficulty in propelling boats upon canals, it is observed, results from the want of sufficient power in the floats, from the circumstances which necessarily restrict their size. This it is proposed to obviate by increasing the number of paddle wheels, either upon the ordinary construction, or upon the plan of the patentee, using four, or such other number of, wheels as may be found necessary.

"Now, what I claim in the above described wheel, and its application, is the mode of dividing the floats into sections, and giving them the relative positions herein set forth. I furthermore claim the principle herein described and illustrated, of diminishing the dimensions of the paddle wheels, and increasing their number in a like ratio, for the purpose of attaining a maximum speed with the least lateral pressure on the banks."

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38. For a *Cooler for Flour;* Joseph Hebard, John B. Catlin, and Thomas G. Abell, Pomfret, Chautauque county, New York, May 22.

"The improved cooler consists of a rolling screen, or shaking sieve, which receives the ground grain, or meal, from the elevators. by means of a common conveyer, instead of having it conveyed to hopper boys, as is usually the case. The conveyer which receives the

meal from the elevator, and conveys it into the screen. The spout which conducts the coarse bran from the screen. Conveyers which are placed under the screen, and receive the meal after it is separated from the coarse bran, and conduct it back and forth through the machine a sufficient number of times to cool it. A spout which receives the meal from the last conveyer, and through which it falls into the bolter; and a case which covers the whole, excepting the first conveyer, with slanting sides, to direct the meal which falls, or is sifted through the screen, into the last conveyer."

The drawing represents three conveyers below the rolling screen, which successively receive the meal, and convey it back and forth, and the specification enlarges upon the advantages derived from the use of this apparatus, which is simple in its principle, compact, and, we have no doubt, efficient. There is no claim made, but it is obvious that the general arrangement is the subject of the patent, the individual parts being spoken of as familiarly known.

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39. For a *Composition to Prevent the Absorption of Oils by Wood;* Nathaniel Hathaway, Fairhaven, Bristol county, Massachusetts, May 22.

The patentee claims "the application of glue to prevent the absorption of animal and fish oil by wood, whether used alone, or combined with the other ingredients aforenamed, and whether those ingredients are used in the proportions set forth, or in other and different proportions."

Glue has been used between the staves of oil casks, to prevent the leakage which otherwise takes place, and a few years ago this application was made the subject of a patent. The effect of glue in this particular is so familiarly known, that, had any one inquired of us how to prevent the absorption of oil by wood, we should have said, "saturate it with glue," and that without supposing that we were telling a secret.

The composition referred to by the patentee is two pounds of glue, dissolved; one quarter of a pound of *whale foots;* one quarter of a pound of bright varnish; and one quarter of a pound of rosin, melted together, and combined by stirring, adding thereto a sufficient quantity of water to give it a proper consistence. This composition, it is said, is more easily used than the glue alone, as it will longer continue limpid.

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40. For a *Lamp for Burning Volatile Materials;* George Eyles, Boston, Massachusetts; an alien, who has resided two years in the United States; May 22.

The construction of this lamp is very much like that of the blow pipe by alcohol; but it is not, like it, furnished with a reservoir and wick below the recipient of the spirit; but the jet through which the vapour is to issue is carried down below the body of the recipient, and thus supplies the requisite heat.

41. For a *Washing Machine;* John T. Denniston, Alexander, Genesee county, New York, May 22.

A cylinder, like a barrel churn, is to revolve on gudgeons; on the inside of this there are to be strips of wood, running from head to head, forming flutes like the teeth of a wheel, projecting inwards. Within this barrel there is to be a loose cylinder, extending nearly from end to end, having flutes upon it which mash between the strips on the barrel. This is to be of metal, or of wood loaded, and the washing is to be effected by the rolling of this upon the clothes.

The claim is to "the peculiar construction of the inside of the outer cylinder; and to the detached cylinder, and their application to the purpose of washing."

Most of the washing machines which have been introduced, have proved to be more troublesome than beneficial, and to this class the present will undoubtedly belong; the clothes will become lapped round the detached cylinder, and will make sad inroads upon the pacific disposition of the washerwoman.

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42. For improvements in the construction of *Time-pieces;* William Pardee, Albany, New York, May 22.

The improvements claimed in this time-piece, refer both to the case and the movement. The object in view is to construct an instrument, which, whilst it possesses the requisite accuracy, may also, from the simplicity of its construction, be afforded at a price far below that of those now in use.

The whole case for a mantel time-piece, including the dial-plate, is to be cast in one entire piece, of iron, zinc, or other metal. In the movement there is to be three wheels, and two pinions only, arranged in a manner very similar to those in Ferguson's clock. The following is the claim.

"I do not claim to be the inventor of a time-piece, with three wheels and two pinions, such having been before constructed; but what I do claim as my invention, is the general arrangement and combination of the respective parts, made and operating in the manner described; not intending, however, by this claim, to confine myself to the precise form and manner of construction designated; but to vary the same in any way which I may think proper, whilst I proceed substantially upon the principle by me laid down. I also claim the casting, in metal or in sand, in one entire piece, the cases, or stands, of mantel, or bracket, time-pieces, as hereinbefore shown. I also claim the casting, in *metal* moulds, the straps and pillars, the pulleys, the pallets, and other parts, so as to come therefrom in nearly a finished state."

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43. For a *Double Lever Scale;* Elias A. and Asa Hibberd, Lunenberg, Essex county, Vermont, May 29.

This is a platform balance, in which the arrangement of the levers differs in some points from any which has preceded it, but not in a way which appears likely to give greater accuracy to the instru-

ment; a thing, indeed, hardly to be desired. A scale is hung upon the steelyard, in such a situation as to weigh a hundred fold, and a movable poise gives the intermediate weights. The claim would occupy more than a page, and we cannot, therefore, find room for it; it includes the whole description of the machine, and extends to many things which have been before used.

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44. For an improvement on the *Roller Gin*, patented March 7th, 1834; William Whittemore, Jr., West Cambridge, Middlesex county, Massachusetts, May 29.

This machine is well described, and distinctly represented in the drawing; without the latter, its description could not be made clear, nor would the claim be intelligible. As it is an instrument in which but few of our readers are interested, the necessity of passing it over with this slight notice is the less to be regretted.

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45. For improvements in the *Boilers, Valves, and Cam, of the Steam Engine;* John Kirkpatrick, city of Baltimore, May 29.

The specification of this patent will hereafter be published, together with that of some further improvements, which are now nearly completed.

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46. For a *Cast-iron Cider Mill;* Philip Pryer, Alexander, Genesee county, New York, May 29.

This mill is formed much like the common bark mill, with a nut on a vertical shaft, revolving in a cast-iron box. The grooves, or flutes, in the nut and box, are sufficiently deep at top to receive the apples, and diminish as they run spirally down to the lower side, where the grinding is finished. The exact dimensions of the respective parts constitute nearly the whole of the description, and the claim is to "the cast-iron cylinders, with all their above described particulars in form and use."

We should have been at a loss, had the task of making a claim devolved upon us, as there is an equal want of originality in the particular parts, and in their mode of combination.

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47. For a *Churn;* Philip S. Lowell, Farmington, Kennebec county, Maine, May 29.

This churn is much like that noticed at No. 11. The body of it is an oblong box, in which there are two dashers, worked by two cranks upon a shaft above it. The patentee has found the means to occupy several pages with the description, and has thus made up in length what the affair wants in originality; whether the entire omission of a claim results from the difficulty of making one, in the present instance, we have not the means of knowing.

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48. For a *Thrashing Machine;* Edmund Warren, city of New York, May 29.

This is a cylinder and concave machine, combining about as much

of novelty as we usually meet with. "The claims in this case are, the form of the frame, made of two pieces of timber, or plates, for the sides, and two for the cross work, which are so arranged as to permit the grain to pass in or out at either side, which will self-sharpen the beaters, and make a strong and cheap frame; also, the principle of reversing the beaters; also, the concave of equal height on both sides, which carries the straw, or throws it, fifteen feet from the machine, and saves the work of a man to clear it away from the machine."

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49. For a *Machine to Excavate and Remove Earth;* Nathan Currier, Methuen, Essex county, Massachusetts, May 29.

One, two, or three spades, made in the form of the common scraper used for excavating, are to be hung upon a carriage running upon wheels. There are windlasses and chains for raising or lowering the cutting edges of the spades, and for turning them over when the load is to be discharged.

All that is claimed, is, "the form of hanging and arranging the spades, together with the manner of turning them over to unload."

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50. For *Furnaces for Burning Lime, and Smelting Ores;* John Owings, Adams county, Pennsylvania, May 29.

Much more is proposed in the specification of this patent than will ever be accomplished by the patentee, but this is a case so frequent, that it ought to produce but little disappointment. By means of the kiln, or furnace, described, wood is to be converted into charcoal, and by means of the heat evolved in this process, lime is to be burnt, and iron, and other, ores reduced. A furnace is to be built, the side walls of which may be forty-five feet in length, and ten feet in height, leaving ten feet in the clear between them; this furnace is to be arched over from end to end, and at its bottom there are to be grate bars, at the height of two feet from the ground, a number of pillars being built to support them. Several air holes are to open into the space under the bars, all of them furnished with air-tight shutters; there are also several flues on each side, and a main flue at one end, all capable of being closed when necessary. The wood to be converted into charcoal, is to be first placed upon the bars, to the height of a foot, and upon this six inches of limestone, which is to be succeeded by alternate layers of each, until the furnace is filled to the top of the arch.

When ores are to be reduced, they are to take the place of the limestone, and the bottom of the furnace is to be so constructed as to receive and conduct the reduced metal to the front, whence it is to be drawn off. When the reduction has not been completed by the charring process, air is to be admitted, so as to allow the charcoal to burn partially, until the heat is sufficient; after which the residue is to be collected. If pit coal is used, it is to produce coke in the same way, which also is to be saved.

What is claimed as new, "is the use of a raised floor, or grating,

whereon to rest the stone, or ore, and fuel, in combination with the vents, as herein set forth, by which the heat of the furnace is rendered perfectly manageable, and the balance of the fuel, after the operation of burning, or smelting, is converted into charcoal, or coke, when wood, or bituminous coal, is used."

The patentee has set forth numerous advantages which are to result from his invention, "the principal of which are the saving of fuel in the burning of brick, tiles, delft, &c., &c.; to iron and brass founders, manufacturers, and builders, all of which would be interested by the low rate at which the valuable articles of lime and charcoal could be procured," &c.; from the whole affair, however, it is plain that he is neither an experienced lime burner, an iron founder, or a smelter of other metals; if the former, it would not have been necessary for him to have discovered, by the aid of a smiths' forge, that lime acquires about a welding heat for calcination; and if a founder, he would never talk of reducing iron ore by means of wood, or coal, alone, and saving the charcoal, or coke.

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51. For a *Machine for Making Brick;* William Tucker, Luray, Page county, Virginia, May 29.

To describe this machine, would be merely to exhibit the particular arrangement adopted by the patentee in placing his hopper, which is to receive the prepared clay, the brick mould, presser, striker, &c., which have frequently been combined together in a very similar manner. His claim is, to "the manner in which he combines and puts together the several parts, as set forth."

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52. For a *Mortising Machine;* Ira Gay, Dunstable, Hillsborough county, New Hampshire, May 29.

After describing his machine, the patentee says, "I do not claim any part of said machine as new in itself, but claim the combination of the known mechanical contrivances in such a manner as have not heretofore been used for the purpose herein described." This indefinite mode of making a claim has become very common, of late, but it certainly does not fulfil that requirement of the law which makes it the duty of the patentee to distinguish his machine "from all other things before known or used." Two machines for the same purpose may be very differently arranged, and yet be substantially the same, in which case the difference of combination would be but colourable on the part of the last claimant, and his patent could not be sustained. We cannot, indeed, perceive any difference between the foregoing claim, and the not making any, as we should esteem it as claiming the whole machine.

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53. For a *Hat Block;* Aaron and Samuel Chichester, Wilton, Fairfield county, Connecticut, May 29.

This hat block is intended to be used in the colouring of hats, and is of the open kind which allows the colouring liquid to come freely into contact with the interior of the article, in the process of dying.

It differs from those open blocks which have preceded it, by being so made as to dilate after being inserted into the crown of the hat, so as to cause it to set close, or tight, thereto.

A piece of metal, of suitable size, is to be made circular, and is to be perforated, near its edge, by eight, or any other convenient number of mortises, which are to receive the ends of eight slats, or pieces, of wood, which are to form the sides of the open block. This round piece of metal may be called the fixed head. A smaller disk of metal fits within the slats, passing in at the lower end, and having its edge notched to receive the inner edges of the slats, the latter being made sloping, so that this movable head, as it is forced in, will cause them to recede from each other. A screw passes from the centre of the fixed to the centre of the movable head, by which the latter is forced in, and the effect intended produced. The contrivance being deemed essentially new, no particular claim is made.

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54. For a *Machine for Planing Sash Stuff;* Ira Gay, Dunstable, Hillsborough county, New Hampshire, May 29.

The claim to this machine is in the same terms as that made to No. 52, for mortising. The planes are to be made to travel back and forth, as in other machines for planing sash stuff; the method of effecting this differs from, but is not better than, the plans previously adopted.

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55. For an *Odometer;* Joseph Fuller, and Aaron A. Richardson, Brunswick, Cumberland county, Maine, May 29.

The patentees denominate this "an improvement in the art of measuring and indicating distances traveled by wheeled carriages." Such machines have been constructed in numerous ways, and have been made to operate so well as to leave but little to desire in this particular. The patentees say, "we do not claim an exclusive right to odometers, or machines for measuring and indicating distances traveled by wheeled carriages; but we do claim the lever and the cams, their form and connexion with each other, and the general arrangement above specified, as our improvements, and we further claim whatever is new in the above described machine."

We gave the specification of Mr. Turner's odometer, with a plate, at p. 336, vol. xiii. The operation of this machine was perfect, but we presume that the demand for it has not amounted to half a dozen; it, therefore, is to be considered more as a thing of curiosity than of utility, and any man of ingenuity may contrive twenty different modes of arranging the parts, and call them improvements, but the public will not buy them.

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56. For a *Thrashing Machine;* Henry Johnson, Washington county, Tennessee, May 29.

A claim is made to "the making, putting on, and operating, of the cogs, or thrashers, on the cylinder, and the elastic apron underneath

the said wheel, or cylinder." What is called the "cogs, or thrashers," consists of teeth placed obliquely upon cast-iron beaters, in which there is about as much novelty as there is in "the elastic apron underneath."

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57. For an improvement on the *Straw Cutter;* Stephen Ustick, city of Philadelphia, May 29.

This is intended as an improvement of the machine previously patented by Mr. Ustick, and which we noticed in due course; the description of this improvement could not be understood without the drawing, nor would the claim alone give any adequate idea of it.

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58. For an improvement in the *Cooking and Baking Stove;* Hiram G. Phelps, Pleasant Square, Johnstown, Montgomery county, New York, May 29.

The omission of a claim in a cooking stove, must necessarily leave us at a loss to discover what is intended to be patented, and such is our situation in the present instance. The stove is to be made principally of sheet tin, or other polished metal, capable of reflecting heat, and the cooking is generally to be performed by means of charcoal, though other fuel may be employed. It is proposed, usually, to have two ovens, one above the other, with a flue, or reservoir of heat, between them; various modifications of the construction, however, are mentioned, but as they certainly are not all new, and are indiscriminately presented, our only clear course seems to be to pass them by, until the patent is reissued under an amended specification, should this ever be done.

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59. For a *Cooking Stove;* John C. Kolbe, city of Philadelphia, May 29.

This stove is the same in form and substance with the cooking stove patented by A. D. Spoor, and described at p. 103. The only difference consists in making the holes in the top plate, to receive kettles, &c., nearer to the edge, and placing a dividing, or intermediate, plate in the drum, with openings in it to direct the heated air under the cooking utensils. The claim made is to the "placing said plate in the cylinder, or drum, as above described, dividing it into two parts, and collecting the heat above such plate, and directing it into a flue opening near the centre."

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60. For a *Power Gaining Machine;* Philo C. Curtis, Utica, Oneida county, New York, May 29.

This the patentee calls "A method of applying power to produce an increased velocity by means of cams, or inclined planes, arranged circularly around the shaft, or wheel, to be driven."

Were we inclined to waste money and time, we might do so by giving a copy of the drawing and description of the apparatus here patented, which is a kind of horse power, in which the animal, at-

tached to a lever, is to turn a wheel, so connected to a shaft by means of movable levers, inclined planes, and friction wheels, as to increase the power without diminishing the velocity.

Specifications of American Patents.

Specification of a Patent for an improvement in the Mode of Heating and Applying Heated Air to Blast Furnaces. Granted to Isaac Tyson, Jr., *city of Baltimore, April* 18, 1834.

To all whom it may concern, be it known, that I, Isaac Tyson, Jr., of the city of Baltimore, have invented an improvement in the mode of heating and applying heated air to blast furnaces in metalurgical operations, and I do hereby declare that the following is a full and exact description thereof.

It is a well established fact that great advantage is derived from heating the air which is to be applied to furnaces for smelting, and other operations of metalurgy requiring high degrees of heat; and my invention or discovery consists in a mode of taking advantage of this principle in a new way, which will admit of the employment of anthracite coal so as to supply a large portion of the heat required, and a consequent and great diminution of the proportionate quantity of the charcoal or coke usually employed.

The form of the apparatus which I employ will admit of considerable variety; I do not therefore confine myself to that particular modification which I am about to describe, as I have chosen this on account of its simplicity, to exemplify the principle upon which my invention is dependent.

I construct a cylinder of cast, or wrought, iron, of such dimensions as must be determined by the size of the furnace to be supplied, and the degree of temperature to which it is determined to heat the air. This cylinder I place vertically, and make one opening in the side thereof for the admission of air from the blowing apparatus, and another for the conveyance of the heated air into the furnace; placing them in such positions as shall cause the heated air, in its passage from one to the other, to be subjected to the heating influence of the ignited fuel which is contained within the cylinder.

The cylinder I line with fire brick or other non-conductor of heat, suitable for the purpose, and within it I place a grate to contain the ignited fuel which is to heat the air. This grate may extend across the entire cylinder, so as to support the fuel; it may be situated at any convenient part of it between the pipes for the ingress and egress of the air. Proper openings must, of course, be made in the cylinder for the supply of fuel, which may be contained in a reservoir, so as to be heated before it is introduced; the modes of effecting this are known to those conversant with furnaces.

Sometimes I intend to enclose a second cylinder within the former, which second cylinder is to contain the fuel, leaving a space between the two for the circulation of air. This second cylinder is to be open at top for the introduction of the fuel, the space between it and the

outer one being permanently closed; it may reach down to the bottom of the entire cylinder, or nearly so. The upper part of it, say for half its length, more or less, may be made without openings, whilst the lower part is to be formed into bars, or otherwise perforated in the manner of a grate. When filled with fuel, an air tight cover is placed upon it, being made close by luting or otherwise. The upper part of this cylinder serves as a reservoir for fuel, and to adapt it to this purpose more fully, it may be extended to any convenient height above the outer cylinder.

Instead of allowing the pipe through which the blast is introduced to terminate at the inner surface of the outer cylinder, I intend sometimes to conduct it across the space between the two, and into the inner cylinder within which the fuel is contained; governing myself in this and other points by the degree to which I may find it desirable to heat the air.

Although I do not intend to confine myself to the employment of anthracite coal in my heater, yet it is my design in most cases to use it exclusively, believing that one of the great advantages of my invention will consist in so doing, and that by heating the air therewith, I may diminish the quantity of charcoal or coke to such an extent as only to require such a portion to be mixed with the ores, or other metallic matter, as will be necessary to keep up the ignition, and to produce the requisite chemical action.

What I claim as my invention, and for which I ask a patent, is the heating of the air, which is to be supplied to blast or other furnaces, in a separate vessel, in which it is to be brought wholly or partially into contact with ignited fuel, upon the principle, or in the manner, hereinbefore set forth, whether the same be done precisely in the way described, or in any other in which the same effects are produced by analogous means.

ISAAC TYSON, JR.

Specification of a Patent for an improvement in Machinery for the Throwing, or Twisting, of Silk. Granted to LUCILIUS H. MOSELY, *Poughkeepsie, Dutchess county, New York, May* 9, 1835.

The ordinary method and machinery in use, (for which the one invented by me is intended to be a substitute,) consists of two rollers, one resting upon the other, and weighted down by means of a spring, or dead weight, in order to prevent the thread from passing through faster than the natural delivery of the rollers; the threads being governed through the rollers, and down to the spindle, by means of guide wires on each side of the rollers. My improvement, or invention, is this,—that in lieu of the two rollers and guide wires, a single grooved roller is used for each thread, with a band of leather around and affixed to its larger surface, its smaller surface being a polished groove, on which to secure the thread, and pass it to the spindle, the thread being passed over and around the groove. This grooved roller is turned (thereby delivering the thread to the spindle,

or spool,) by a second roller, on which it rests, the leather surface touching and resting upon this second roller, and is carried round by it, by reason of the mere weight of the grooved roller. This grooved roller revolves around a screw-pin, or pivot, passing through its centre, and affixed to an arm, the other end of which arm is attached by a like pin, or pivot, to a part of the twisting frame, (or to a stand which is attached to the twisting frame,) in such a manner that the end upon which the grooved roller is placed, may (together with the roller) be raised from the second roller, when necessary, either for attaching or detaching the thread. This grooved roller may be made of different metals, or of other materials.

The benefit of this improvement and invention, is, that it dispenses with the guide wires, is more simple, easier to tend, does not mangle, cut, or waste the thread, and is more rapid in its operation than the method now in use.

LUCILIUS H. MOSELY.

Report to the Directors of the Grand Junction Railway, between Birmingham and Liverpool, England. By JOSEPH LOCKE, Chief Engineer.

GENTLEMEN:

In submitting for your consideration, the following remarks on the subject of rails and chairs, I wish briefly to state the reasons that have induced me, (after you have already decided on the form of rail,) to investigate the question. Under ordinary circumstances, I might have been justified in simply giving a preference to a particular form of rail, without stating the grounds on which that preference was founded; but considering the present conflicting opinions on this very important subject, and the scarcity of data upon which to form a correct judgment, I have thought that, by contributing the few observations I have made to the general stock, the cause in which you, as well as the public, are interested, might be advanced.

The longitudinal and transverse forms of rail, the form of chair and fastening, and the propriety of placing the blocks further apart, are the subjects to which I have more particularly directed my attention.

The fish-bellied, or elliptical, form of rail is already well known. It is deepest in the middle, between the supports, and the material is so disposed, that, when uniformly loaded, it is equally strong at all points.

The parallel rail, on the contrary, is weakest in the middle, and, if loaded excessively, would break midway between the supports; and as it is absolutely necessary to give the requisite strength in the middle, it follows that at every other part, the parallel rail is unnecessarily strong.

The strength of a uniform bar of iron is as the breadth and square of the depth directly, and as the length inversely. In other terms, if the breadth be doubled, its strength is doubled; if the depth be dou-

bled, the strength is quadrupled; and if the length, or distance, between the supports be doubled, then the strength is impaired one-half.

If an elliptical bar be $3\frac{1}{2}$ inches at the least, and 5 inches at the greatest, depth, a parallel bar of equal weight will be about $4\frac{1}{4}$ inches, and the relative strength in the middle, (supposing the breadth and distance between the supports to be constant,) being as the square of the depth, will be as 25 is to 18.

This advantage, however, is only gained at one point, viz: midway between the supports; and it gradually diminishes, until it corresponds in depth with the parallel bar, which, when the supports are three feet apart, is at nine inches from the end, and at this point the two rails are equally strong; but for the remaining distance to the support, the parallel bar is the strongest.

I am aware that, theoretically speaking, the extra strength of the parallel rail near the ends is of no advantage, because, as has been well observed, the efficiency of a structure can only be estimated at the weakest point; but I wish that circumstance to be noticed, as I shall have occasion hereafter to direct your attention to it.

The formulæ for ascertaining the strength of iron beams are derived from experiments made upon peculiar sections, and with various kinds of iron. Some experiments have recently been made at Newcastle, on the strength of railway bars, and these, therefore, are more applicable to our purpose than any others, although they are not altogether free from objection. The deductions, which I think are very fairly drawn from these experiments, are,

That an elliptical rail weighing 45 lbs. per yard, is equal in strength to a parallel rail, weighing 50 lbs. per yard.

That when a weight of 96 cwt. was applied in the middle, with 3 feet bearings, the deflection in the former was $\frac{1}{20}$th of an inch, and in the latter $\frac{1}{14}$th part of an inch.

The depth of the fish-bellied rail in the middle was 5 inches, and at the end $3\frac{1}{2}$ inches. The depth of the parallel bar was 4 inches.

Now, if the two rails had had similar sections, the parallel bar ought to have been $4\frac{1}{4}$ inches deep, instead of 4 inches, and would have been $\frac{1}{8}$th stronger.

However, I think there can be no doubt that, both theoretically and experimentally, of the two rails with similar sections, the elliptical, with the same quantity of material, is the strongest form.

But the question for consideration is, whether, from the construction of railways, and the effect of heavy bodies rolling along them at high velocities, we can safely apply theoretical or even experimental deduction? For my own part, I think that the experience obtained from the working of the Liverpool and Manchester, and other railways, affords much safer data upon which to proceed; and although I would not reject experimental data, I would only apply it in connection with the more generally practical results obtained from these lines.

It is well known that a very considerable number of the elliptical rails on the Liverpool and Manchester line has been broken, whilst

on those lines where the parallel rails have been used, there are few instances of a broken rail. The causes that have led to this unexpected result will hereafter be considered.

By far the greater number of rails have broken at about 7 or 8 inches from the block, and, in nine cases out of ten, at 7 or 8 inches from the joint block, or end of the rail. This circumstance has induced a belief that the rail is not of the true eliptical form, but that it is weakest at this point; it will, however, be found that the point where the greatest deviation from the elliptical form occurs, is not that at which the fractures have generally taken place.

The rails used on the Liverpool and Manchester railway weigh 35 lbs. per yard—the greatest depth is $3\frac{1}{2}$, least depth $2\frac{1}{2}$; now, the effect of any weight at different parts of the rail is as the rectangle of segments into which it is divided. If therefore it be necessary to have a 3 feet rail, $3\frac{1}{2}$ inches deep in the middle, the depth at nine inches from the end will be as $18^2 : 8\times28 :: 3\frac{1}{2}^2 : 2.91^2$ inches; but the actual depth is 2.94 inches, therefore it is at this point about 1-30 of an inch too deep. The calculated and ascertained depths at other parts of the rail are:

	Calculated depths.	Actual depths.
At 6 inches from the end, -	2.60	2.76
7 - - - - - -	2.77	2.85
8 - - - - - -	2.91	2.94
9 - - - - - -	3.03	3.02
10 - - - - - -	3.13	3.10
11 - - - - - -	3.22	3.20
12 - - - - - -	3.29	3.30
13 - - - - - -	3.36	3.36
14 - - - - - -	3.41	3.40
15 - - - - - -	3.45	3.44
16 - - - - - -	3.47	3.45
17 - - - - - -	3.49	3.49
18 - - - - - -	3.50	3.50

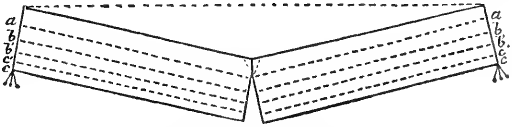
Thus we find, that up to 9 inches from the end of the rail is stronger than theory assigns, whilst from 9 inches to 12 it is a little weaker, but in so small a degree as not to be worth considering. The depth of the rail, at 9 inches from the end, is equal to the depth due to a parallel rail of the same weight per yard. And if the Liverpool rails had been parallel instead of elliptical, and of the same weight, the fracture, instead of being near the end, would, according to theory, have been in the middle, and the number of broken rails increased in the proportion of nearly 2 to 3. There have been no parallel rails exactly of this weight made; therefore, whether this proportion would hold true in practice remains undetermined. If, however, a parallel rail had been used, as deep in the middle as the elliptical rail now is, viz. $3\frac{1}{2}$ inches, its weight would have been about 42 lbs. per yard, and the number of broken rails ought to have been the same, the point of fracture only being changed.

This reasoning, theoretically speaking, would be conclusive, had we not the experience of the Bolton, Wigan, St. Helens, and part of

the Liverpool and Manchester railways, wherein such rails have been used, and where very few have yet been broken.

These rails weigh $41\frac{1}{4}$ lbs. per yard, and are $3\frac{1}{4}$ inches deep. May we not therefore fairly conclude that experience does not bear out the theoretical advantages of the elliptical rail? The chief causes of failure may, in my opinion, be traced to the defect in fastening the rail into the chair, and the difficulty of preserving the uniform level of the blocks. An attentive consideration of the effect of a heavy body moving along a railway will sufficiently prove this. From the unequal settling, or subsiding, of the ballast, the level of the blocks becomes unequal, and so soon as one becomes lower than its neighbours, every wheel that passes over it strikes a blow and drives it lower. The force of this blow depends on the depression of the block, which not unfrequently exceeds half an inch. When this occurs, the weight of the load is alternately thrown to the inner edges or arrises of the adjoining chairs; and thus not only is the weight thrown on one side of the block, but a considerable strain is given to the longitudinal key. In some cases there is an alternate action, first on one side of the block and key, and then on the other, thus producing a rocking motion to the block, which very soon alters its level, and to the key a fretting motion, which soon shakes it loose. When the latter is accomplished, the rail which has very little substance at the bottom is liberated; and it is then, and I believe not till then, that the rails break, for it has been well ascertained that a beam, fastened at the ends, will bear nearly double the weight that will break it when the ends are loose. And this view is confirmed by the fact, that, in nine-tenths of the rails hitherto broken, the fracture has taken place near to the ends.

Another cause of the failure of the fish-bellied rail arises from the want of an under-web. It is well known that the strength of beams is increased by adding to the substance at the bottom, and this increase will be found to be much more important when the rail is subjected to blows, rather than to weights laid or rolled smoothly along its surface. The fibres at the bottom of a beam are more strained than those in the middle, because they lie at a greater distance from the neutral axis.* This will be best understood by a reference to



the drawing above, where a fractured beam is represented. The line *a a* represents the neutral axis; the lines *b b*, *b′ b′*, &c. the position of the fibres of iron or other material dividing the beam into several pivots. Now the extension of the fibre at *c′ c′* is to that of any other

* The neutral axis, or axis of motion, is in that part of a beam where all the fibres above it are compressed; and all those below are extended. It is situated above the middle, but varies in differently shaped beams, and with different qualities of material.

fibre as its distance from the neutral axis, and it follows that at *c′ c′*, where the distance is greatest, the elasticity of the material will be first destroyed. This, therefore, is the point where the greatest number of fibres is required, and more particularly to resist a sudden shock, or blow; for, in this case, the elasticity of the lower fibres might be destroyed before those placed nearer the neutral axis had been called into action. The same may be said of the fibres above the neutral axis, which resist by compression; the upper fibres of the rail being further from the neutral axis are more compressed than those below them. The position of these fibres may be compared with the bundle of sticks in the fable: place them in such a manner as to allow them to act together, and they will resist the load, but take them singly, and each will break. A deep narrow bar is certainly the most rigid, but, (as Tredgold has well observed,) although it will bear an immense pressure, the stroke of a hammer will fracture it.

This view of the subject leads to the conclusion, that to increase the depth without reference to the breadth of projection on the underside, is not the way to obtain the best railway bar; and it is to this under-web in the parallel rail, small as it hath hitherto been, that its superiority is in some measure attributed. The obvious remedy for this defect in the elliptical rail would be to give to it this projecting web, but this, even if practicable, could only be accomplished with difficulty.

This comparative view of the two forms of rail refers only to the condition that the bearings be 3 feet apart, and the saving of iron, in this short length, is not so much as would appear from the comparison instituted with 6 feet bearings. I have no doubt that with the blocks much further apart, the elliptical rail, by the addition of an under-web, might be used successfully and economically; but until some means be found by which an under-web can be given to the elliptical rail, I think we ought to confine ourselves to the parallel form.

So far, therefore, as the longitudinal form is concerned, I am favorable to the parallel rail, and the transverse section which I would recommend is that in which, after allowing sufficient width for the carriage wheels to roll upon, a moderate thickness of the rib, (due regard being had to the height of the chair,) all the remaining substance should be thrown into the under-web. It was with this view that I formed the model which you have already adopted, and which has also been adopted by the North Union Railway Company; and taking into consideration a suggestion made after much experience by Mr. Sinclair, that it would be desirable to be able to turn the rail upside down, should the upper surface become defective, I decide upon making the upper and lower rails precisely similar; but this has been accomplished without impairing its strength. It has been stated that this contingency of turning the rail is "dangerous, and done without foresight;" but, (unless it be shown that some benefit is sacrificed,) I cannot see why this project should be so named.

If a rail be not similar, top and bottom, it is evident that we are

confined to one side, which, when it becomes worn or imperfect, is useless, and the rail must be sold as old iron; but if it will turn, even supposing it to have been so much worn as to be too weak for the purposes to which it may have been before applied, it may still be used on sidings, or branch lines, where the engines are lighter, or the speed not so great. That there is an advantage in being able to turn a rail, even to make choice of sides, when first laid, is well known to those who lay them, and therefore this contingency should not in my opinion be so totally disregarded. In preparing this, and the model for the chair, I have had three objects in view.

Firstly, Whilst giving the rail a sufficient bearing surface on the chair, so that one shall not groove or cut the other, I propose to reduce the length of the bearing at least one-half, by which the tendency to rock the block, and tear off the chairs, will be reduced 50 per cent.

Secondly, To prevent the rail from rising in the chair, which is proposed to be accomplished by the large projection on the rail, the filling piece, and the wooden key: which, so long as either of the latter keep their places, will prevent the rail from lifting up.

To prevent or lessen the liability of loosening the key, I propose,

Thirdly, That the filling piece shall only touch the rail for one inch on each side of the centre of the chair, instead of two inches, as heretofore; so that by any flexibility of the rail, or settling of the blocks, the action on the key will be reduced 50 per cent., and that continual fretting or tremor, which is so prejudicial to the long iron keys now in use, will be abated in the same proportion.

The joint chair has two filling pieces and two keys, the object of which is to insure a more certain hold of both rails, and which cannot be done by one key. Each key acts independently of the other, and therefore any working loose of one rail does not necessarily, as at present, liberate the other.

I may here be permitted to make an observation on the wooden key. It is upwards of 8 months since you instructed me to try an experiment with wooden keys on the Liverpool and Manchester line, and I caused about 100 yards to be laid, adapting the key to the rail and chair when in use. The objection raised at the time was, that wood was not sufficiently durable, and that it would decay and become chafed by the working of the rails in the chairs, and thus be worked loose. I was quite aware that this, to a certain extent, would be the case, although I believe not so much as materially to affect the stability of fastening. I have just examined these keys, and have great reason to be satisfied with them. There is a joint rail or two which rises in the chair, but this is caused more from the want of substance in the rail to hold it down, than from the key; some of the keys would bear tightening, others would not, but none were loose; I at the same time examined the rails laid down under the direction of Mr. Stephenson, and found them in very good order; there are but a few lengths laid, but these were upon the whole very firm and solid. I was induced to try the wooden keys, because I believed those of iron were worked loose by the jarring and fretting motion produced by the passage of every carriage over them. There is not sufficient

elasticity in iron thus applied, to yield or adapt itself to the strain which the changed position of a rail, when deflected, throws upon it, and, therefore, wherever this evil exists, iron keys will ultimately work loose. There is more yielding in wood, which adapts itself more uniformly to the side of the chair against which it presses, and does not, like the iron key, touch only in points; and by making the recess in the chair smaller in the middle, and using the wood quite dry, the projecting part of the key expands, by absorption of moisture from the atmosphere, and is thus prevented from being worked or drawn out. It is similar in principle to a cork in a bottle, the middle part of the chair, like the neck of the bottle, being the smallest. It is quite evident, that the decay from long exposure to the weather is the only thing to be guarded against, but I maintain that, if they last but two or three years, they will be found to be economical. Wooden sleepers are not more durable than stone blocks, but still they are used. Why should not wooden keys last as long as sleepers? There must also be less noise from a train where wooden keys are used; the reason is obvious, for the substitution of a softer material between the rail and chair prevents the vibrations of the former from being communicated to the latter.

The successful application of wood for keys is very important, and I regret that these keys were not practically tested when I first suggested them, (now upwards of two years since,) but I shall continue to watch the operation upon that part of the Liverpool line now laid with them, so that we may yet take advantage of any change that time may produce.

I come now to consider the propriety of placing the blocks at a greater distance from each other.

The reasons that have induced me to recommend this to your consideration are not strictly confined to economy, (although I shall be able to show some advantage on that score,) but to a conviction that much of the wear and tear, not only of the rails and chairs, but of the engines and carriages, will be avoided. There is one point to which I wish to direct your attention, viz.: That so long as the blocks are not placed further apart than the axles on the carriages, no more weight can ever at one time be placed on one block; and therefore the blocks do not by this suggested change require to be larger, nor the foundations to be firmer, than they are at present. An inspection of the drawings will render this apparent.

If a carriage bear upon each wheel a load of 3 tons, it presses when immediately above the chair with that weight upon the block. The block and the foundations should therefore be prepared to resist this load; now, if the chairs were placed 2 feet apart, or the blocks put close together, so as to touch each other, the very same weight must be borne to each block and foundation; in short, however close the chairs are placed, they must each bear the weight of the wheel when it comes perpendicularly over it. From this it would appear, that if the axles of the carriage be 6 feet apart, the blocks might be 6 feet apart, without requiring to be larger, or the foundations to be better made.

The axles of the coaches and wagons now in use are about 6 feet apart, none less than 5 feet, whilst the blocks are 3 feet; the injurious effect of this arrangement upon the machinery and road, I will now endeavour to show.

It may have been remarked by the Directors, that on some parts of the Liverpool and Manchester Railway, the engines and coaches have, when in full speed, a very considerable swinging motion, which I believe arises from the inequalities in the road. Instead of the surface of the rails being uniformly smooth, they offer to the wheels a series of inclined planes or waves, and the blocks immediately opposite to each other not being equally depressed, the carriages work upon the springs, and produce the motion already mentioned. Now, the intensity of this motion will depend upon the quick succession of change in the level of the blocks, and if one block be sunk half an inch, and the adjoining one not at all, the rail will be inclined at the rate of 1 in 72. If, again, the next succeeding block be not depressed, the engine has again to rise up an inclined plane of 1 in 72. In some instances the opposite rail is inclined just in the opposite direction, in which case we have two opposite wheels of an engine, one running down hill, and the other up. This I believe is no exaggerated picture; and it is not confined to the Liverpool and Manchester road, but will occur wherever the bearings are so much shorter than the coupling of the wheels. It was the undulating appearance combined with the motion of the engines, (which I have observed on all newly constructed railways,) that first drew my attention to the subject; and I have so far considered it important, as to believe that many of the evils hitherto experienced may be traced to it. The causes producing these effects are obvious. The ballast, as I have before observed, settles unequally. The first settling is assisted by the force with which the engines strike the rail, and this increases as the blocks settle lower. The foundations being unequal, some blocks sink more than others, and at high velocities, the engines, instead of gliding smoothly along the rail, actually jump from joint to joint, and where the depression is half an inch, will jump 20 inches without touching the rail. What will be the effect of a blow of a heavy engine under such circumstances? A broken rail! There seems to me no other way of accounting for the breakage of rails on the Liverpool and Manchester railway, than from this supposition. We know that the new 50 lbs. elliptical rail is stronger in the middle than the parallel, and yet two of these have broken near the middle. This could not be produced by simple pressure. For in the same rail, afterwards tested, the iron was bent nearly double without breaking. Is this not a proof of the existence of sudden shocks produced by the bounding of the engines? Why have so many rails been broken in Olive Mount cutting? Because some of the blocks are resting on the bare unyielding rock, whilst others are upon a thick layer of ballast, which after settling makes the undulations of the rail more abrupt, and consequently the blows from the engines more effectual.

To increase the stiffness of the rail, or, as Mr. Barlow has suggested in a very valuable report on this subject, just published, to place the

blocks immediately opposite to each other, so that the two wheels of a carriage may rise and fall together, is not the way to remedy the evil. The more feasible plan is to prevent the block from sinking, or, what is the same thing, to bring the rail from an inclined to a level plane. This may be partly accomplished by placing the blocks further apart; for if we suppose that the foundations would, with bearings 6 feet apart, still settle half an inch, the inclination of the rail would be 1 in 44, instead of 1 in 72. But, if the settling of the blocks be caused by these sudden undulations of the road, it is clear that by reducing the undulations, the settling will also be reduced, and thus a further approximation to a level will be obtained. I am quite aware, that by increasing the distance of the bearings, the deflexion of the rail itself will be increased; but within a limited distance, this would bear so slight a proportion to the depression of the blocks, that I would rather attempt to reduce the greater, so as to equalize the two evils, than submit to the sudden inequalities produced by short bearings. If the elliptical rail be objected to, because the deflexion, when an engine has passed over a block, is more sudden than on the parallel rail, (the latter being more rigid near the supports than the former,) how much more objectionable must be the sudden deflexions that arise from the sinking of the blocks? If a rail, which deflects 1-20th of an inch, be prejudicial, how much more must it be if depressed five times as much? Nor, with longer bearings, will the keys be so apt to become loosened; for the groove in the chair being horizontal, and the key being driven into this groove, there is clearly less violence done to the fastening, by the rail taking an angular position of 1 in 144, than if such rail were to be bent down to 1 in 72. In short, the nearer the rail approaches to a level, the more likely are the keys to remain fast. If, therefore, by extending the distance between the supports, we can present a more even surface of the rail for the engines to run upon, we shall not only save the wear and tear of the road, and of the machinery, but shall do more towards lessening the breakage of the rails than we can hope to do by simply adding to their weight.

I had previously calculated the load which our rail with wide bearings would support, and I had some doubts whether to recommend you to place the blocks 3 feet 9 inches, or 5 feet apart. Wishing however to take advantage, in this stage of our proceedings, of every circumstance which might ultimately affect the stability of the road, I determined, at the suggestion of Mr. Earle, not entirely to rely on calculation for determining the question, but to make a set of experiments with our own and other rails, at different bearing distances, so that we might not on the one hand omit this opportunity of deriving all the benefit, nor on the other proceed too far without being quite sure of the consequences of the recommendation. That this question was worth the trouble of these experiments will, I think, be apparent by the following estimate of saving, which I had for some time previously made.

If the bearings were increased to 5 feet, we should have 3 blocks to every 15 feet rail, instead of *five*, therefore 2-5ths of all the blocks,

chairs, spikes, keys, plugs, &c., on the line, would be saved, and these would amount to no less a sum than £69,000.

If the bearings were 3 feet 9 inches, we should save 1-5th, and this saving would amount to £34,500.

(TO BE CONTINUED.)

¶ *Cow's Portable India-Rubber Boat.*

Sir,—In your journal of the 20th June last, a correspondent makes mention of an India-rubber boat which was constructed by Mr. Cow, of his Majesty's Dock-yard, Woolwich, in 1829, that is several years before the Americans, who now claim the honour of the invention, ever imagined, or, at least, produced any thing of the sort, and reference is made to a treatise on boats by Mr. Cow, in which the subject is treated of at length. Having in my possession a copy of Mr. Cow's work, I have made an extract from it, which I now send you, of the part relating to the India-rubber boat, in the hope that you will in justice as well to a most ingenious individual as to a very useful invention, give it a place in your widely circulating pages.—Yours, &c.

T.

On the Construction of a Portable Boat for landing and embarking the Horses attached to a Field Gun, or Cavalry of any description, on a beach and through a surf.

One of the most pleasing circumstances resulting from my endeavours to introduce improvements in boats is, that of giving me an opportunity of conversing with officers of rank and experience, and thereby obtaining the necessary information for carrying on the several public services, and what alterations would be desirable in them, could they be effected; a species of information which, from my station in life, I could have no means of obtaining by my own observation. It was during a conversation with Captain M'Kinley, R. N., (who has frequently done me the honour to inspect my propositions,) that he mentioned the difficulties that usually arise in landing or embarking horses on a beach, should there be any surf; and he also particularly stated what took place at the Helder, 1799, when after the General (Sir Ralph Abercrombie) was landed, it was found impracticable for a considerable time to get a horse on shore for his use, which he was exceedingly anxious to effect; it being of the greatest importance that he should be mounted. It was at length accomplished by a captain in the navy, who volunteered his services, mounted the horse, and swam him on shore through a great surf, at the imminent risk of himself and horse. This conversation forcibly impressed on my mind the necessity of some plan to accomplish this object; and it also occurred to me, that could it be effected, it would be a most essential addition to my proposition for landing the mounted field-gun, as then the horses attached to the gun might be landed at the same time, and under the same circumstances of weather and surf. I, in consequence, set about making the most diligent inquiries, not only

at the model-room of the Royal Military Repository at this place, but also of all the officers, old soldiers and sailors with whom I could communicate, as to whether there was any established method of performing this service; and if not, what means were generally resorted to.

Although there are models at the Repository, showing the manner in which horses are hoisted in or out of transports when alongside of a wharf, I could not discover any which applied to the landing of them on a beach; and all the information I could collect was, that they were either placed in flat-bottomed boats, or that two long boats from the transports were lashed together, and a platform laid on them, with stanchions and a guard rope to prevent the horses from going overboard. It must be evident that should the surf extend any distance from the shore, it would be utterly impossible to accomplish the object by either of the methods here mentioned, and the only resource left would be, to get the transports as near as possible to the beach, to hoist the horses out, and swim them on shore; the risk of drowning or laming the horses by this mode must be apparent. Admitting it to be possible to swim horses on shore under those circumstances, I conceive it would not be practicable to embark horses in that manner: for, in the first place, it would be most difficult to get them to take the water through the surf; and even should they be got off, there would be still a great difficulty in slinging them to hoist them in. I am informed that in the retreat from Corunna, in 1809, there were a number of valuable horses in the town the night before the battle; and although there were transports in the bay, yet, from the want of means to embark them, the whole were destroyed.

It may also be stated that the flat-bottomed boat is considered a great evil on board a ship of war or transport; it is very heavy to hoist in or out, and it occupies a large space on a ship's deck; or should they be placed on skids over the quarter-deck, they are, from their elevated position, a great encumbrance.

In order to overcome these difficulties, I constructed a model, of which the following is a description.

My first object was to devise a portable boat, one that might be easily taken to pieces, and stowed away in a comparatively small space, and which might be put together, not only with facility, but by any description of men. During the time I had the superintendence of the building of the boats for Captains Franklin and Parry's northern expeditions, I had frequent opportunities of observing Mackintosh's patent water-proof canvass; one boat was built and covered with it in this dock-yard,* and one by Colonel Pasley, Royal Engineer, at Chatham, for Captain Franklin's overland expedition; and I was strongly impressed with the idea, that a canvass of this description, but much stronger, and finished in a different way, might materially assist me in making the boat portable.

The form of the boat became the next consideration. It was desirable that it should be such as would be best calculated to encoun-

* Captain Franklin did not take this boat.

ter a surf, and not longer or broader than to contain four horses (which number appeared sufficient to land at a time,) and to be of such a depth as to preclude the possibility of the horses springing out. I am sanguine in the belief that I have been successful in the form, as it respects encountering a surf, as I am told she resembles the Massulla boats of Madras.

In order to make the boat portable, and to do it in as simple a manner as possible, the different parts of her frame are connected by iron screws and brass nuts; the screws are so made that they may be turned in by hand, consequently no tools are required, and she may be put together by any men of common understanding. To facilitate which, the four quarters of the frame of the boat are painted of different colours, and marked; therefore it is almost impossible to err; the screws also are all cut with the same die, and the only precaution necessary is with regard to their length. The boat is constructed with a flat floor, and there is a strong platform for the horses to stand on, which is carried sufficiently high to prevent the possibility of an accident; there are three thwarts at the proper height, for the security of the boat, and parting bars are placed on the gunwales, to keep the horses separate and steady. When the frame of the boat is put together, a water-proof canvass covering is put over it, and laced to the gunwales, when she becomes a perfect boat.

As it is intended to draw the boat up and down a beach, it becomes necessary to protect that part of the canvass which may come in contact with stones or uneven ground; therefore she is placed on a sledge, which will keep her nearly a foot from the ground, and also perfectly upright and steady when hauled up.

The boat is twenty-four feet long, eight feet six inches broad, and four feet deep, and when taken to pieces, it may be packed (with the exception of the keel and gunwales) in two cases, each ten feet long, two feet six inches broad, and two feet deep; and is not only competent to carry four horses, but also their harness, and whatever stores may be necessary.

When it is required to land horses, the boat is to be put together on the ship's deck, and hoisted out, the horses must be lowered into her, and secured in the usual way; the boat is then transported as near to the beach as the surf or local circumstances will admit of, a rope previously fastened to the sledge is got on shore, and a sufficient number of men will haul her through the surf and half her length up the beach: the canvass at the fore-part of the boat is then unlaced and rolled under the bows, the screws at the scarphs of the gunwales, at the risings, footwaling, and keel (ten in number), are taken out, when the fore-part of the boat may be removed, and the horses can walk out.

As I have not seen the boat hauled up with horses on board, I am unable to state the number of men necessary to perform it, but I consider it will require between forty and fifty men. When the first four horses are landed, they may be made to assist the landing of the remainder.

When it is required to embark horses, the boat is put together on

the beach, the horses led into her, the bow closed up, and with the assistance of an anchor or boat, moored without the surf, she is heaved afloat.

On the 26th of November, 1827, I had the honour to submit and to explain my model to the Honourable Navy Board, who declared themselves perfectly satisfied with it, and ordered a boat to be built on the above principle in this dock-yard, which was done, and examined by his Royal Highness the Lord High Admiral, as well as by many distinguished officers of the navy and army, and it was subsequently sent to Portsmouth for trial on South Sea beach, but I have not heard that an opportunity has yet offered for doing so.

From various experiments which I have made on the strength and water-proof qualities of the canvass used for the covering of this boat,* I feel justified in stating that it may, and that it will, be used for many important and highly useful purposes, particularly as connected with the naval and military services. It occurred at the battle of Navarino, and also in many actions during the last war, that, at the conclusion of the engagement, the boats when required to board the prizes were found to be so perforated with shot, that they would not swim, and a considerable time elapsed before they could be made effective; and I have heard that many prizes have been lost in consequence of this state of the boats. This was distinctly the case in the defeat of the combined French and Italian squadrons near Lissa, in March, 1811, by the squadron under the command of the late Sir William Hoste. Sir William states,† "I must now account for the Flora's getting away after having struck her colours. At the time I was engaged with that ship, the Bellona was raking us, and when she struck I had no boat that could possibly take possession of her." Also of the capture of the Rivoli by the Victorious, in the Adriatic, in April, 1812, the latter ship's boats were so much injured, that they would not swim, and the prize was boarded by Lieutenant (now Captain) Peak, and one man, in a dingy.

Now if every ship of war was supplied with a covering of this description, previously fitted to one or more of her boats, which covering might be kept below until wanted, however much the boat may be hit with shot, or staved, (provided her form was not entirely destroyed) by placing this covering over her, she becomes in less than two minutes an effective boat, and fit for any service.

In obedience to directions from his Royal Highness the Lord High Admiral, a small boat was built in this dock-yard, on the principle of the horse-boat: she was twenty feet long, five feet ten inches broad, and two feet two inches deep, weighed five hundred weight two quarters, and was packed in two cases, one fifteen feet long, fourteen inches broad, and nine inches deep; the other six feet one inch long,

* This manufacture being composed of two pieces of cloth, united by a solution of India-rubber, is of immense strength. The canvass used for this boat was prepared by Mr. Thomas Hancock, who manufactures this article (for Messrs. Mackintosh and Co.) in London, and was quite a specimen of the perfection to which this mode of water-proofing has been brought.

† Vide London Gazette, May 18, 1811.

one foot ten inches broad, and one foot four inches deep. This boat was taken in the yacht on his Royal Highness' visit to Portsmouth and Plymouth in July last, and was put together at each of those ports, when thirty men were embarked, and she was rowed round Plymouth harbour with that number of men. Not the least weakness was apparent, and not a drop of water came into her. She was subsequently sent to Portsmouth for his Majesty's ship Madagascar, at the request of Captain the Honourable Sir Robert Spencer. Also, two boats, similar to the one supplied to the yacht, have been built for the settlement at the Swan River, Western Australia.

For military purposes I feel confident that portable flying bridges, on the principle of those at Antwerp, and at several towns on the Rhine, might be constructed in this manner with great advantage, and when made light, and suitable to pack in a small space, might be eminently useful to an army.

Perhaps I ought to apologise for presuming to speak on military subjects; and I must again observe, that I pretend to no other knowledge than what I have collected in conversation with experienced officers, and from reading. In Sir Walter Scott's History of Bonaparte, there are many passages which strengthen my statement, viz. that circumstances have risen where boats constructed in the manner above described would be exceedingly useful. In vol. iii., p. 119, Sir Walter states, that "Bonaparte himself observed that the passage of a great river is one of the most critical operations in modern war." Page 122—"They had to pass (the Po at Placenza) in common ferry boats, and the crossing of the advanced guard (five hundred men) required nearly half an hour; so that the difficulty, or rather impossibility, of achieving the operation, had they been seriously opposed, appears to demonstration."

"The vanguard having thus opened the passage, the other divisions of the army (between fifty and sixty thousand men) were enabled to cross in succession; and in the course of two days, the whole were in the Milanese territory, and on the left bank of the Po."

But perhaps the most striking case is mentioned in vol. vii., p. 212, when treating on the advance of the French army towards Moscow:—"The river Willia being swollen with rain, and the bridges destroyed, the Emperor, impatient of the obstacle, commanded a body of Polish cavalry to cross by swimming. They did not hesitate to dash into the river, but ere they reached the middle of the stream, the irresistible torrent broke their ranks, and they were swept down and lost almost to a man."

[*Mech. Mag.*

A Rule for ascertaining the Diameter of a Hollow Cylinder which shall contain the same quantity of matter as a given Solid Cylinder.

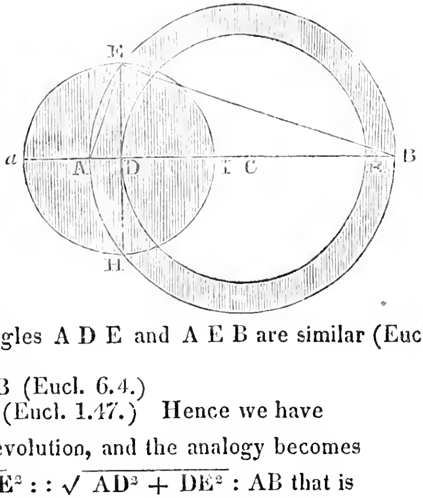
To the Editor of the Repertory.

Sir,—Tredgold, in his excellent Treatise on the Strength of Cast Iron, page 128, 2nd edition, gives a ready method, by geometrical

construction, for ascertaining the radius of a solid cylinder that will contain the same quantity of matter as the tube or hollow cylinder. However it more frequently happens, that, in practice, you require to find the diameter of a hollow cylinder that shall contain the same quantity of matter as a given solid cylinder, the breadth of the circular ring being given; a rule for which I have not yet been able to discover in any work extant. If you think the following rule worthy insertion in your valuable work, it is at your service, and I have no doubt it will be found of utility to those who are in the habit of using cast-iron, particularly when it is considered, that the strength of a column, or shaft, is doubled by expanding the matter into a tube, care being taken not to have the ring less in breadth than three-twentieths of the diameter, otherwise the tube would not be capable of retaining its circular form: three-twentieths ought to be the extreme. If d, be the diameter of the solid cylinder then 0.98 equals the lesser, and $1.4d =$ the greater diameter of the hollow cylinder, when the strength is doubled.

Problem. Given the area and breadth of a circular ring, to find the diameters of its bounding circles.

Construction. Let the circle E G H I be equal to the area proposed. Through the centre D draw the diameters G I and H E cutting at right angles in D: make D A equal to the given breadth, and join A E. From E draw E B perpendicular to A E meeting G I produced in B: bisect A B in C, then is C the centre, and C A, C D the radii of the bounding circles.



Calculation. The triangles A D E and A E B are similar (Eucl. 6. 8.): therefore,

$$AD : AE :: AE : AB \text{ (Eucl. 6.4.)}$$

But $AE^2 = AD^2 + DE^2$ (Eucl. 1.47.) Hence we have

$AD = \sqrt{AD^2 + DE^2}$ by evolution, and the analogy becomes

$$AD : \sqrt{AD^2 + DE^2} :: \sqrt{AD^2 + DE^2} : AB \text{ that is}$$

$$AB = \frac{AD^2 + DE^2}{AD} \text{ or } CA = \frac{AD^2 + DE^2}{2AD}$$

and $CD = CA - AD = \dfrac{DE^2 - AD^2}{2AD}$ Whence we have the following.

Rule. Divide the sum and difference of the squares of the radius of the given circle and breadth of the ring by twice that breadth for the radii of the greater and less bounding circles respectively.

Example. Suppose the area of the ring or its equivalent circle E G H I to be 201.0624 inches, then will its radius

$$DE = \sqrt{\frac{201.0624}{3.1416}} = \sqrt{64} = \text{inches; and suppose the breadth of}$$

the ring to be 1.5 inches. Then will $AE = \sqrt{66.25} = 8.1394$ inches, then by the preceding analogy we have

$$1.5 : 8.1394 :: 8.1394 : 44\tfrac{1}{6} = AB \text{ and}$$

$$44\tfrac{1}{6} - 3 = 41\tfrac{1}{6} = DR$$

Wherefore $CA = 22\tfrac{1}{12}$ and $CD = 20\tfrac{7}{12}$

But to perform the same thing by the rule we have

$$DE^2 = \frac{201.0624}{3.1416} = 64$$

$$AD^2 = 1.5 \qquad = 2.25$$

$$\text{Sum} = 66.25$$

$$\text{Diff.} = 61.75$$

$$2\ AD = 3 \text{ therefore}$$

$CA = \dfrac{66.25}{3} = 22\tfrac{1}{12}$ and $CD = \dfrac{61.75}{3} = 20^7$ the same as before.

Otherwise algebraically:

Put a = the given area, b = the breadth of the ring, $\phi = .7854$, and let x represent the outer diameter.

Then will $x - 26$ = the inner diameter, and

$46\phi(x - b) = a$ by the property of the circle.

Therefore $x = \dfrac{a}{46\phi} + b$ = the greater diameter, and

$\dfrac{a}{46\phi} - b$ = the less. But $4\phi = 3.1416$.

Wherefore the expression for the diameters is

$$\frac{a}{3.1416\,b} \pm b. \text{ That is}$$

3 B 2

Divide the given area by 3.1416 times the breadth, and the sum or difference of the quotient and breadth will give the greater or less diameter accordingly, being a rule preferable to the one derived from the construction. Or, divide the square of the diameter by four times the breadth, and the quotient increased or diminished by the breadth will give the diameters. I am,

Your obedient Servant,

May, 1834. G. Gottam.

[*Rep. Pat. Inv.*

Patents in Great Britain.

The principal grievances of which inventors have to complain in the new patent law of Great Britain, are briefly these:—

First. The enormous Expense for Patents.

The cost of a patent for a new invention for England, Scotland, Ireland, and the Colonies, is, including the specifications, seldom short of 400*l*. The cost of entering a new book at Stationer's Hall is only half a crown. Inventors are taxed as no other subjects of the Crown are taxed—taxed to an extent which is in all cases oppressive, and amounts in many to absolute interdiction.

Second. The Short Duration of Patents.

The author of any new book or pamphlet—new song or ballad even—is entitled by law to the exclusive copy-right thereof for the space of *twenty-eight* years certain: and for as much longer a period as he may be in life after the lapse of the twenty-eight years. But the inventor of any new instrument, machine, or process, in the arts—no matter how valuable—is only allowed an exclusive property in it for *fourteen.* In the eye of justice, though not law, however, the claims of both stand on precisely the same foundation.

And, *Third. The vexatious Multiplicity of the Forms of Procedure in taking out Patents.*

Most of these forms of procedure exist *for the mere expense sake,* and for no purpose of public utility whatever. Three separate patents and specifications are required for the three kingdoms, when one for all three might and ought to suffice.

NOTICE TO READERS.

We beg leave to call the attention of our readers who may be interested in the matter, to the advertisement upon the cover of this Journal, of the sale of the collection of Minerals belonging to the Baron Lederer, Austrian Consul General. They will be disposed of at public sale in New York, on the 1*st day of May,* 1836.

CELESTIAL PHENOMENA, FOR JANUARY 1836.

Calculated by S. C. Walker.

Day.	H'r.	Min.					
27	14	1	Im.	χ' Tauri,	,5,6,	N. 14°	V. 192°
27	14	47	Em.			234°	283°
28	8	54	Im.	Tauri,	,6,	74°	90°
28	10	14	Em.			312°	361°
29	7	7	Im.	139 Tauri,	,5,6,	147°	93°
29	8	11	Em.			236°	194°

Meteorological Observations for September, 1835.

Moon.	Days.	Therm. Sun rise.	Therm. 2 P.M.	Barometer. Sun rise.	Barometer. 2 P.M.	Wind. Direction.	Wind. Force.	Water fallen in rain.	State of the weather, and Remarks.
				Inches	Inches			Inches.	
	1	51°	64°	29.98	30.00	N. NE	Moderate.		Cloudy—lightly cloudy.
	2	44	65	30. 5	.10	W. NW.	do.		Clear—flying clouds.
	3	52	73	.15	.20	SW	do.		Clear day.
	4	52	75	.20	.20	SW.	do.		Clear day.
	5	62	77	.20	.15	W. SW.	Brisk.		Cloudy—clear.
☉	6	65	82	29.95	29.87	W.	Light.	.62	Cloudy—rain in night.
	7	63	66	.80	.85	W	Moderate.		Cloudy—flying clouds.
	8	49	69	.85	.90	W.	do.		Cloudy—clear.
	9	56	71	.85	.90	E.	Calm.		Clear day.
	10	61	74	.83	.85	W.	Moderate.		Fog—lightly cloudy.
	11	56	68	.90	.90	N. NW.	do.		Clear—lightly cloudy.
	12	60	61	.90	.80	NE.	do.	2.15	Cloudy—rain.
	13	56	64	.75	.75	NE. W.	do.	. 2	Drizzle—cloudy—rain.
	14	58	63	.85	.95	NW.	do.		Cloudy—flying clouds.
	15	45	61	30.20	30.20	NW.	do.		Clear day.
☾	16	43	62	.23	.26	W.	do.		Clear day.
	17	49	65	.24	.20	SE.	do.		Lightly cloudy—clear.
	18	52	70	.00	.00	SE.	do.		Cloudy—flying clouds.
	19	60	67	29.80	29.65	SE.	Brisk.	.31	Cloudy—rain with high winds.
	20	51	64	.32	.32	SW.	do.		Clear day.
	21	52	65	.40	.40	SW.	do.		Clear—flying clouds.
	22	47	63	.70	.80	W.	Moderate.		Clear—lightly cloudy.
⊗	23	47	58	30.00	30.00	W.	do.		Clear—flying clouds.
	24	43	57	. 6	.6	W.	do.		Clear—flying clouds.
	25	43	59	10	.15	W.	do.		Clear—lightly cloudy.
	26	47	62	.20	.20	NE.	do.		Lightly cloudy—clear.
	27	43	61	.00	29.85	SW.	do.		Clear—floating clouds.
	28	54	62	29.63	.63	W.	Brisk.		Cloudy—flying clouds.
	29	46	55	.66	.66	W.	Moderate.		Lightly cloudy.
☽	30	41	52	.65	.65	W.	Brisk.		Clear—flying clouds.
	Mean	51.87	65.13	29.91	29.91			3.10	

	Thermometer.	Barometer.
Maximum height during the month,	82. on 6th.	30.26 on 16th.
Minimum do. .	41. on 30th.	29.32 on 20th.
Mean do. .	58.50	29.91

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AMERICAN PATENTS, LIST OF, WITH EDITOR'S REMARKS, &c.

A.